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TECHNICAL MANUAL

OPERATION AND SERVICE

INSTRUMENT CALIBRATION STANDARD MODEL 829

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TABLE OF CONTENTS

Section		Page
I	INTRODUCTION AND DESCRIPTION	1-1
	1-1. INTRODUCTION	1-1
	1-2. SCOPE OF MANUAL	1-1
	1-4. PURPOSE OF EQUIPMENT	1-1
	1-6. DESCRIPTION	1-2
	1-8. PRINCIPLES OF OPERATION	1-2
	1-9. GENERAL PRINCIPLES	1-2
	1-10. DETAILED OPERATION	1-2
	1-21. ADDITIONAL EQUIPMENT REQUIRED	1-7
	1-23. MODEL DIFFERENCES	1-7
II	SPECIAL SERVICE TOOLS	2-1
III	PREPARATION FOR USE, STORAGE, AND SHIPMENT	3-1
	3-1. PREPARATION FOR USE	3-1
	3-2. UNPACKING	3-1
	3-4. ASSEMBLY	3-1
	3-6. INSTALLATION	3-1
	3-8. FACILITY REQUIREMENTS	3-1
	3-9. POWER REQUIREMENTS	3-1
	3-11. SPACE REQUIREMENTS	3-1
	3-13. PREPARATION FOR STORAGE	3-1
	3-15. PREPARATION FOR SHIPMENT	3-1
IV	OPERATION INSTRUCTIONS	4-1
	4-1. FUNCTIONS OF OPERATING CONTROLS, INDICATORS, AND TERMINALS	4-1
	4-3. PRELIMINARY PROCEDURES	4-1
	4-7. DC OPERATING PROCEDURES	4-2
	4-8. RESISTANCE MEASUREMENT OF INSTRUMENT UNDER TEST	4-2
	4-10. DC VOLTMETER CALIBRATION	4-2
	4-12. DC MILLIVOLT METER CALIBRATION	4-3
	4-14. DC AMMETER CALIBRATION	4-3
	4-16. DC MILLIAMMETER CALIBRATION	4-3
	4-18. DC MICROAMMETER CALIBRATION	4-3
	4-20. ELECTRO DYNAMIC WATT METER CALIBRATION BY DC METHOD	4-4
	4-22. AC OPERATING PROCEDURES	4-4
	4-23. AC VOLTMETER CALIBRATION	4-4
	4-25. AC MILLIVOLT CALIBRATION WITH VACUUM TUBE VOLTMETER	4-4
	4-27. AC AMMETER CALIBRATION	4-4
	4-29. AC MILLIAMMETER CALIBRATION	4-4
	4-31. WHEATSTONE BRIDGE OPERATION	4-5
V	PERIODIC INSPECTION, MAINTENANCE, AND LUBRICATION	5-1
	5-1. THREE MONTH INSPECTION	5-1
	5-3. MAINTENANCE	5-1
	5-6. LUBRICATION	5-1
VI	TROUBLESHOOTING	6-1
	6-1. BASIC PROCEDURE	6-1
	6-3. TROUBLESHOOTING GUIDES	6-1
VII	CALIBRATION	7-1
	7-1. CALIBRATION SCHEDULE	7-1
	7-3. EQUIPMENT REQUIRED	7-1
	7-5. DC CALIBRATION PROCEDURES	7-1
	7-8. DC VOLTAGE CALIBRATION	7-1
	7-10. DC MILLIVOLT CALIBRATION	7-3
	7-12. DC AMPERE CALIBRATION	7-4
	7-14. DC MILLIAMPERE CALIBRATION	7-5
	7-16. DC MICROAMPERE CALIBRATION	7-6
	7-18. AC CALIBRATION PROCEDURES	7-6
	7-19. AC VOLTAGE CALIBRATION	7-6
	7-21. AC MILLIVOLT CALIBRATION	7-7
	7-23. AC MILLIAMPERE CALIBRATION	7-10
	7-25. AC AMPERE CALIBRATION	7-11
	7-27. RESISTANCE CALIBRATION	7-11

LIST OF ILLUSTRATIONS

Number	Title	Page
1-1.	Instrument Calibration Standard	1-1
1-2.	Front Panel of Instrument Calibration Standard	1-3
1-3.	DC Voltmeter, Milliammeter, and Microammeter Calibration Circuitry	1-4

LIST OF ILLUSTRATIONS (CONT)

Number	Title	Page
1-4.	DC Ammeter and Millivoltmeter Calibration Circuitry	1-5
1-5.	AC Voltmeter, Millivoltmeter, and Milliammeter Calibration Circuitry	1-6
1-6.	AC Ammeter Circuitry	1-6
1-7.	Control Circuit Schematic	1-7
3-1.	Non-Variable Frequency Power Source Connections	3-2
3-2.	Variable Frequency Power Source Connections	3-2
6-1.	Calibration Standard Schematic	6-7
7-1.	Constant Input Calibration Connections	7-1
7-2.	DC Voltage Test Equipment Diagram	7-2
7-3.	AC Millivolt Test Equipment Diagram	7-9

LIST OF TABLES

Number	Title	Page
1-1.	Voltage Calibration Ranges of Commercial Instruments	1-2
1-2.	Current Calibration Ranges of Commercial Instruments	1-3
4-1.	Functions of Operating Controls, Indicators, and Terminals	4-1
4-2.	Millivolt Range Data	4-3
4-3.	DC Milliampere Range Data	4-3
4-4.	Microampere Range Data	4-4
4-5.	AC Milliampere Range Data	4-4
4-6.	Wheatstone Bridge Data	4-5
6-1.	Troubleshooting Guide for DC Section	6-1
6-2.	Troubleshooting Guide for AC Section	6-4
7-1.	DC Voltage Calibration Data	7-3
7-2.	Current Data for DC Millivolt Calibration	7-4
7-3.	Voltage Data for DC Millivolt Calibration	7-4
7-4.	DC Ampere Calibration Data	7-5
7-5.	DC Milliampere Calibration Data	7-5
7-6.	DC Microampere Calibration Data	7-6
7-7.	AC Voltage Calibration Data	7-7
7-8.	AC Millivolt Calibration Data, Low Range	7-8
7-9.	AC Millivolt Calibration Data, High Range	7-8
7-10.	AC Milliampere Calibration Data	7-11
7-11.	AC Ampere Calibration Data	7-11
7-12.	Selector Calibration Data	7-12
7-13.	Resistance Ratio Chart A	7-12
7-14.	Resistance Ratio Chart B	7-12
7-15.	Calibration Performance Data	7-13

SECTION I

INTRODUCTION AND DESCRIPTION

1-1. INTRODUCTION.

1-2. SCOPE OF MANUAL.

1-3. This manual provides operation and service instructions for the Instrument Calibration Standard Model 829. (See figure 1-1.) The calibration standard is manufactured by Radio Frequency Laboratories. Incorporated, Boonton, New Jersey. This manual contains a general description, principles of operation, instructions in preparation for use, and data necessary for inspection lubrications, maintenance, troubleshooting, and calibration.

1-4. PURPOSE OF EQUIPMENT.

1-5. The calibration standard is used to calibrate dc voltage instruments between 0.25 millivolts and 2000 volts full-scale, dc current instruments between 2 microamperes and 20 amperes, ac voltage instruments between 1.5 millivolts and 1500 volts, and ac current instruments between 1.5 milliamperes and 20 amperes. Since the dc voltage and current sections are separate, the calibration standard can also be used to calibrate electrodynamic wattmeters by the dc method. Normal voltage and current charts of commercial instruments are provided in tables 1-1

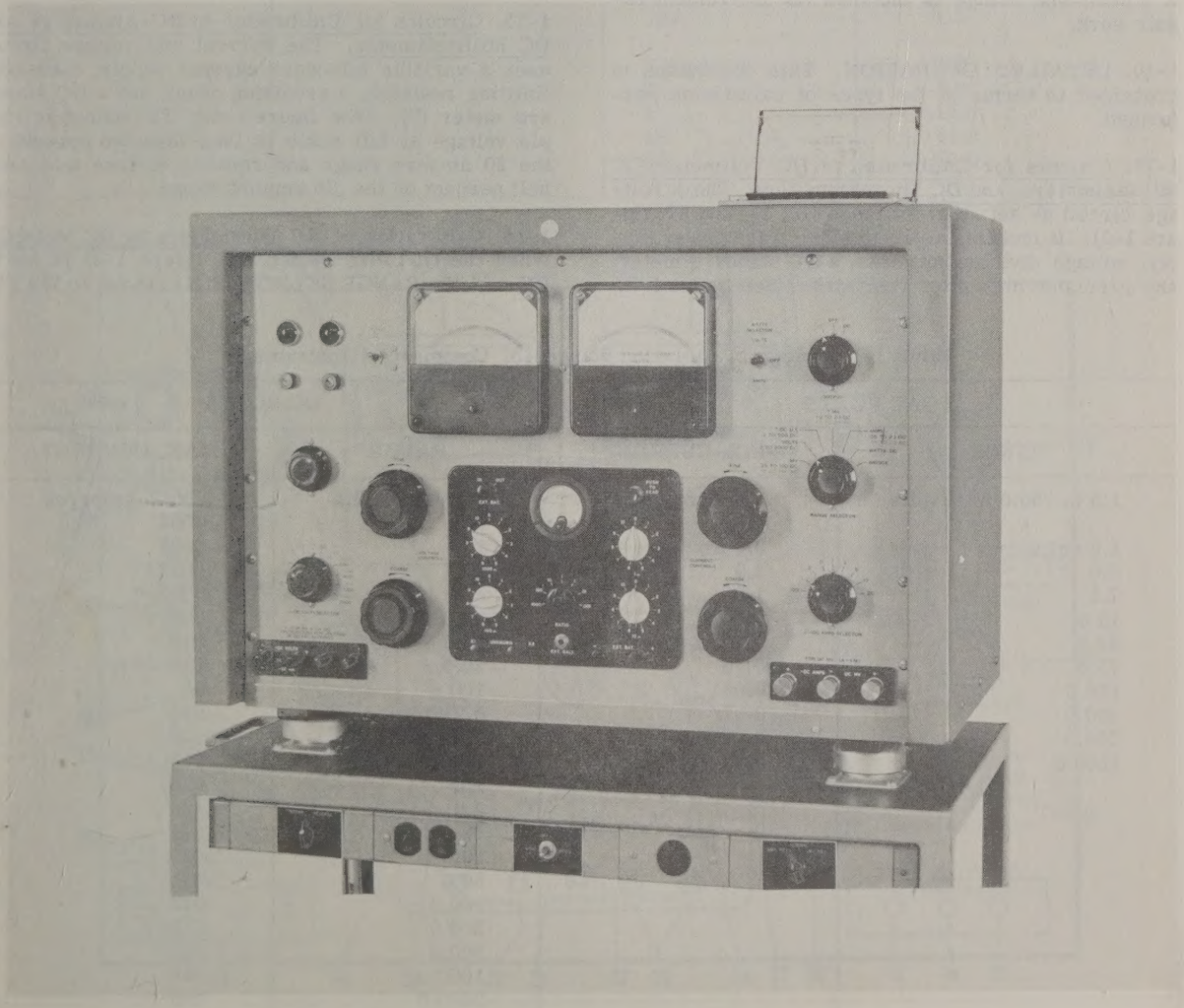

Figure 1-1. Instrument Calibration Standard

and 1-2. The calibration standard can calibrate within ± 0.5 percent of these ranges.

1-6. DESCRIPTION.

1-7. The calibration standard is a complete portable assembly, which can either be placed on a bench or moved on a four wheeled cart. The unit is 32 inches long, 20-1/2 inches high, 16-1/2 inches deep and weighs two hundred and forty-five pounds. It is enclosed in an aluminum alloy cabinet. The power source for the calibration standard is 115 (±11.5) volts and the frequency range of the power source is 50 to 400 cycles, single phase.

1-8. PRINCIPLES OF OPERATION.

1-9. GENERAL PRINCIPLES. The calibration standard consists of wide range ac and dc voltage and current sources, control elements, and two standard voltage and current meters for accurately measuring the magnitude of ac or dc current under calibration. A Wheatstone bridge is included for instrument repair work.

1-10. DETAILED OPERATION. This discussion is presented in terms of the types of calibration performed.

1-11. Circuits for Calibration of DC Voltmeter, DC Milliammeters, and DC Microammeters. The dc voltage circuit is set up by switches (10, 11, and 27, figure 1-2). It includes a variable half wave power supply, voltage dividing networks, a DC standard meter, and precision multiplier resistors. (See figure 1-3.) The FINE (28, figure 1-2) and COARSE (26) variacs control the voltage on the primary of the potential transformer and the output dc voltage. The AC-DC VOLTS SELECTOR (27) connects the required taps on the potential transformer, selects the voltage dividing networks, and determines the multiplier for the desired voltage range. The OUTPUT switch (10) connects the voltage supply directly to the AC-DC VOLTS terminals (25) when the RANGE SELECTOR (11) is set to VOLTS.

1-12. For dc microamperes, a 10,000 ohm decade resistor and 90,000 ohm fixed resistor are connected into the circuit. The decade resistor is adjusted until the total circuit resistance (decade resitor, 90,000 ohm fixed resistor, and instrument-under-test resistance) equals 100,000 ohms. The microampere output for each range is calculated by dividing the indicated voltage by 100,000. For dc milliammeters, only the 10,000 ohm decade resistor is used in the circuit and calculations are based on the 10,000 ohm value.

1-13. Circuits for Calibration of DC Ammeters and DC Millivoltmeter. The current and voltage circuit uses a variable full-wave current supply, a current limiting resistor, a precision shunt, and a DC standard meter (7). (See figure 1-4.) The output ac ripple voltage at full scale is less than two percent on the 20 ampere range and reduces to less than one-half percent on the .05 ampere range.

1-14. Calibration of AC Wattmeters by DC Methods. When the OUTPUT switch (10, figure 1-2) is set to DC and the RANGE SELECTOR (11) is set to WATTS

Table 1-1. Voltage Calibration Ranges of Commercial Instruments

AC VOLTS		DC VOLTS	
RANGE	MAX. CURRENT	RANGE	MAX. CURRENT
1.5 to 750.0 Millivolts	5 microamps	0.25 Millivolts	.00013 Amperes
		0.5	.0003
1.5 volts	3.0 Amperes	1.0	.0005
3.0	2.0	2.5	.0013
7.5	1.0	5.0	.0025
15.0	0.50	10.0	.005
30.0	0.20	25.0	.013
75.0	0.15	50.0	.025
150.0	0.08	100.0	.05
300.0	0.07	0.2 Volts	.030
750.0	0.02	0.5	.030
1500.0	0.02	1.0	.025
		2.0	.025
		5.0	.025
		10.0	.025
		20.0	.020
		50.0	.015
		100.0	.015
		200.0	.015
		500.0	.015
		1000.0	.010
		2000.0	.005

Table 1-2. Current Calibration Ranges of Commercial Instruments

AC CURRENT		DC CURRENT	
RANGE	MAX. RESISTANCE	RANGE	MAX. RESISTANCE
1.5 milliamperes	10,000 Ohms	2 Microamperes	10,000 Ohms
3.0	10,000	5	10,000
7.5	10,000	10	10,000
15.0	10,000	20	10,000
30.0	10,000	50	10,000
50.0	1.0 Voltamperes	100	10,000
100.0	2.0	200	10,000
200.0	2.0	500	10,000
500.0	2.0		
		1 Milliamperes	10,000
1.0 Amperes	2.0	2	10,000
2.0	10.0	5	10,000
5.0	15.0	10	10,000
10.0	40.0	20	10,000
20.0	40.0	50	0.2 Voltamperes
		100	0.4
		200	1.0
		500	1.5
		1 Amperes	3.0
		2	6.0
		5	15.0
		10	45.0
		20	50.0

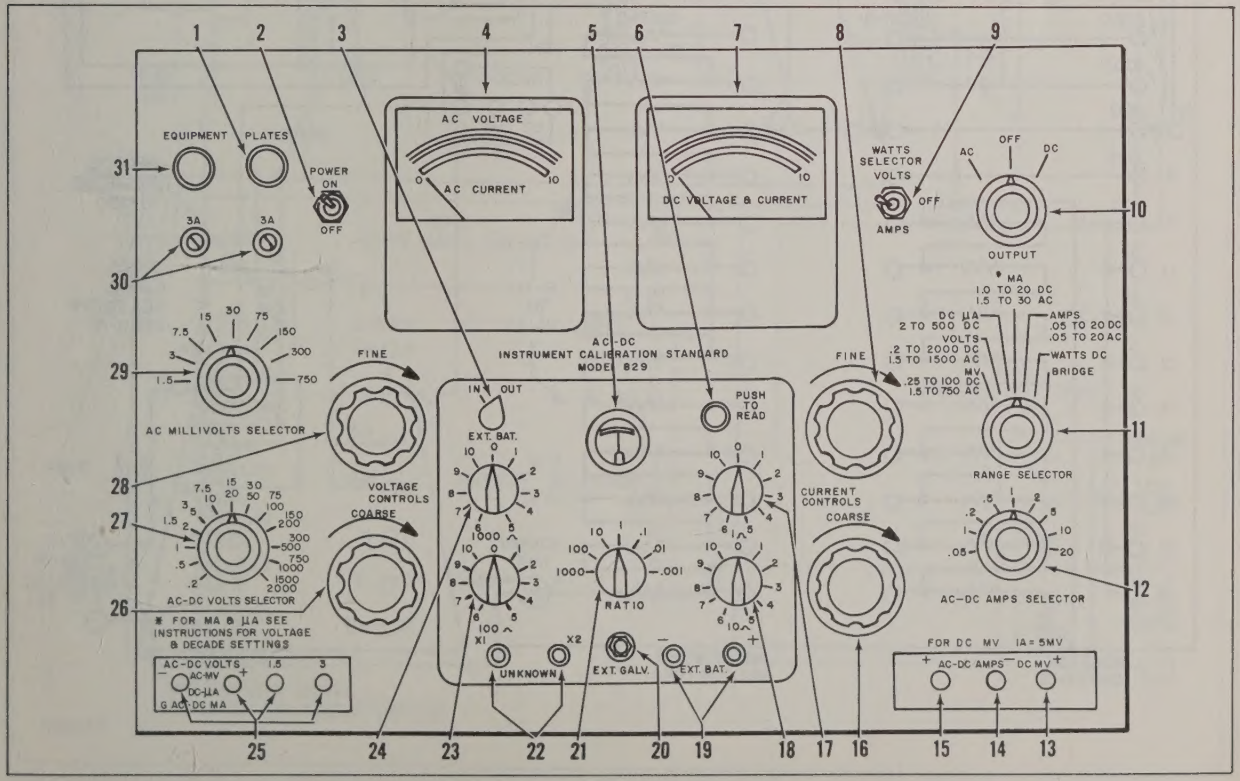

Figure 1-2. Front Panel of Instrument Calibration Standard

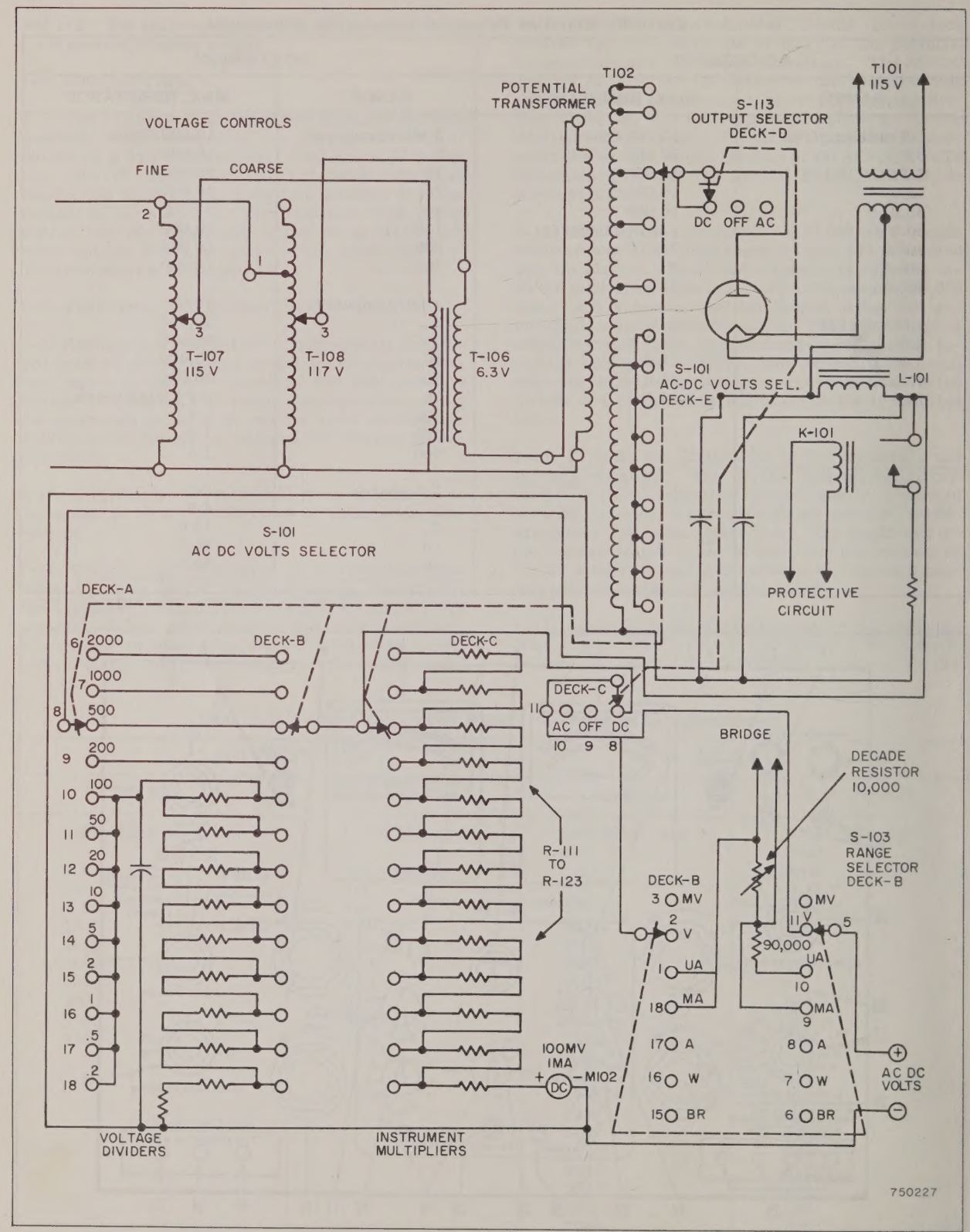

Figure 1-3. DC Voltmeter, Milliammeter, and Microammeter Calibration Circuitry

DC, both the voltage and current sides of the equipment are active. The WATTS SELECTOR switch (9) places the DC standard meter (7) in either the multiplier circuit of the voltage side or shunt circuit of the current side. As the DC standard meter (7) is removed from the circuit, an equivalent resistance is manually connected in its place in order not to change the output current or voltage while the other is being adjusted.

1-15. Circuit for Calibration of AC Voltmeters, AC Millivoltmeters, and AC Milliammeters. The ac voltage circuits are set up by switches. The potential transformer (figure 1-5) is an accurately wound and tapped unit with the turns ratios preset so that the output voltages are about two tenths of a percent high under unloaded conditions, and about two tenths of a percent low with full burden applied. The ac millivolt ranges are used to calibrate vacuum tube voltmeters. For ac milliammeter calibration, decade resistor R102 is switched into the circuit in series with the ac milliammeter under test. Decade resistance is added (by adjusting the white knobs) to the ac resistance of the instrument under test until the circuit has a total impedance of 10,000 ohms at the frequency of calibration.

1-16. Circuit for Calibration of AC Ammeters. The first six windings of the potential transformer (figure 1-6) supply the ac current to the current transformer and external load. The AC standard meter (4, figure 1-2) is used as a basic 75 milliammeter by connecting the current transformer directly across the field coils. The RANGE SELECTOR (11) determines the proper taps on the potential and current transformers for the range desired.

1-17. The function of the control circuit (figure 1-7) is to remove power from the calibration standard and discharge the high voltage capacitors when the calibration standard power is removed.

1-18. Turning any selector switch to a new position removes calibration standard power unless VOLTAGE CONTROLS (26, 28, figure 1-2) and CURRENT CONTROLS (8, 16) are first set to zero (maximum counterclockwise position). A microswitch on each switch shaft breaks the holding circuit of the relay whenever the switch is moved. The circuit also discharges the capacitors in the high voltage power supply at the instant the VOLTAGE (26, 28) and CURRENT (8, 16) CONTROLS are returned to zero.

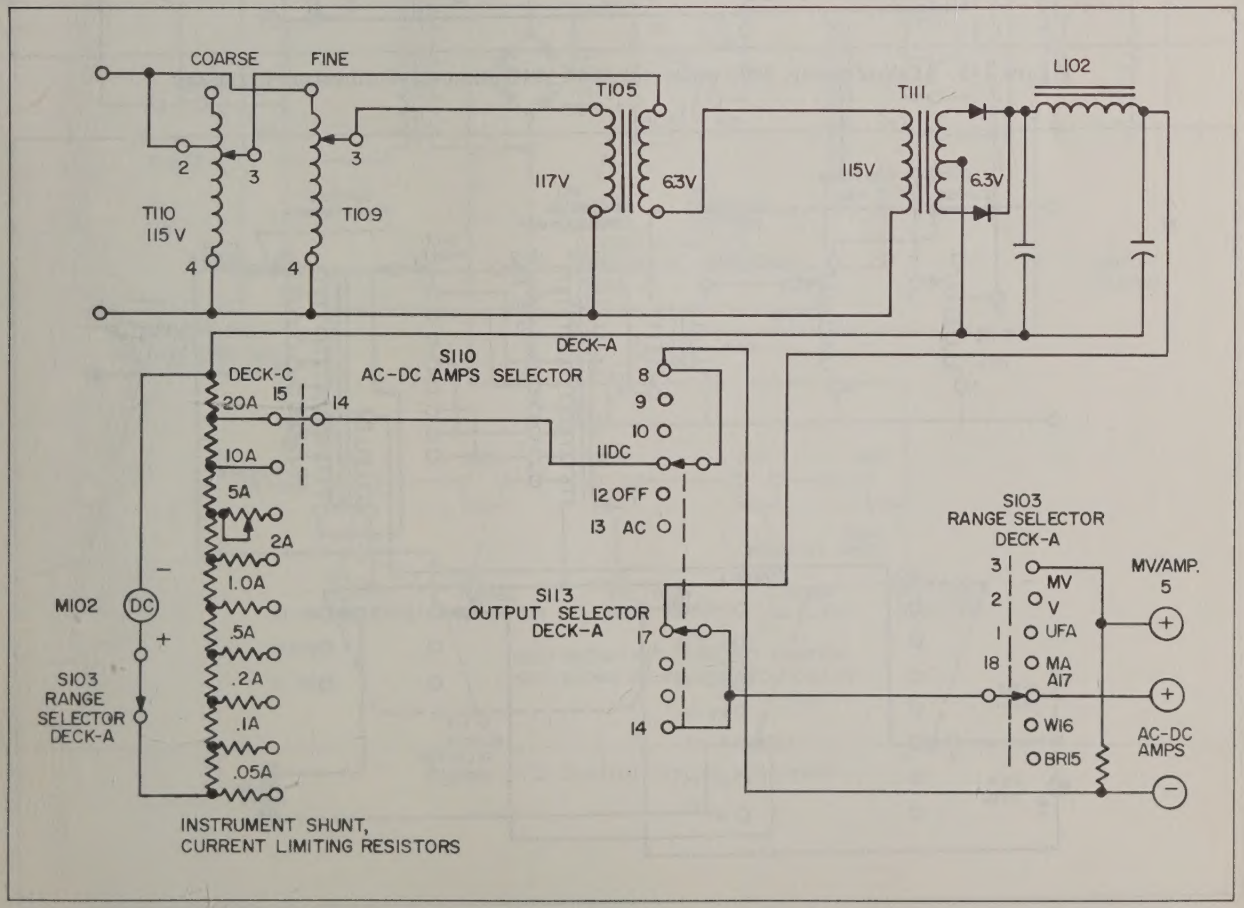

Figure 1-4. DC Ammeter and Millivoltmeter Calibration Circuitry

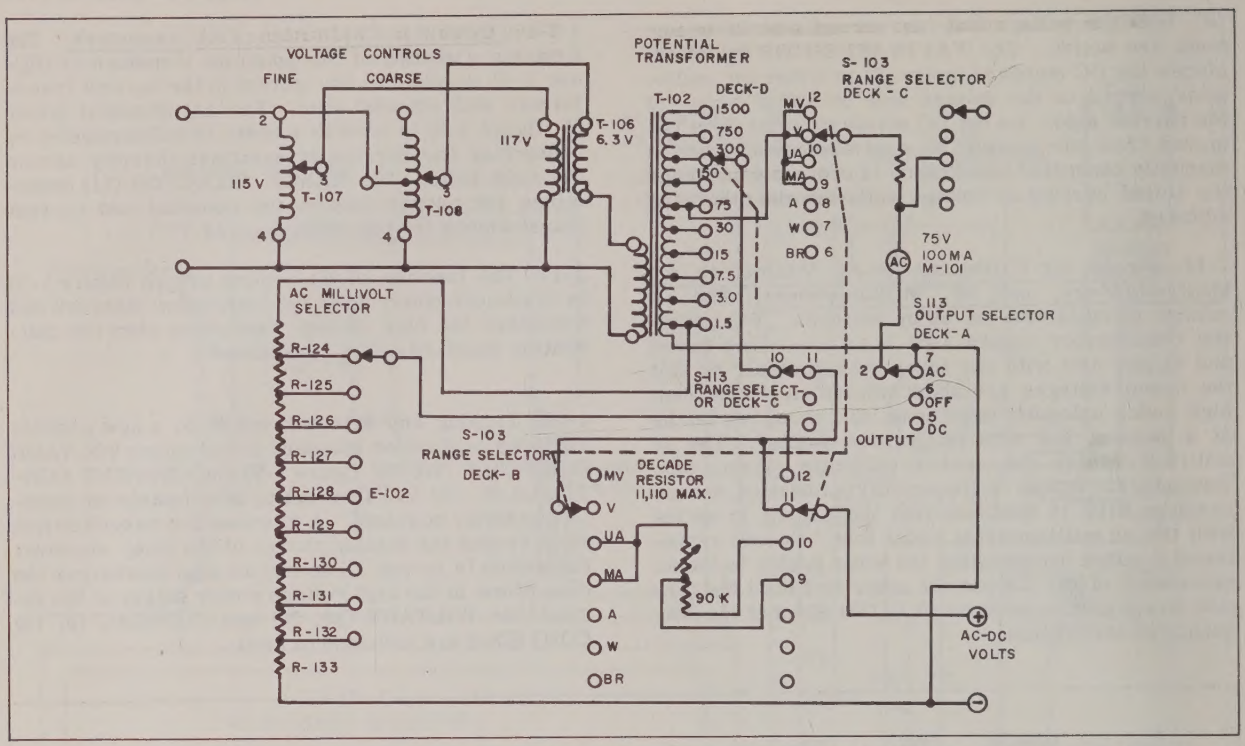

Figure 1-5. AC Voltmeter, Millivoltmeter, and Milliammeter Calibration Circuitry

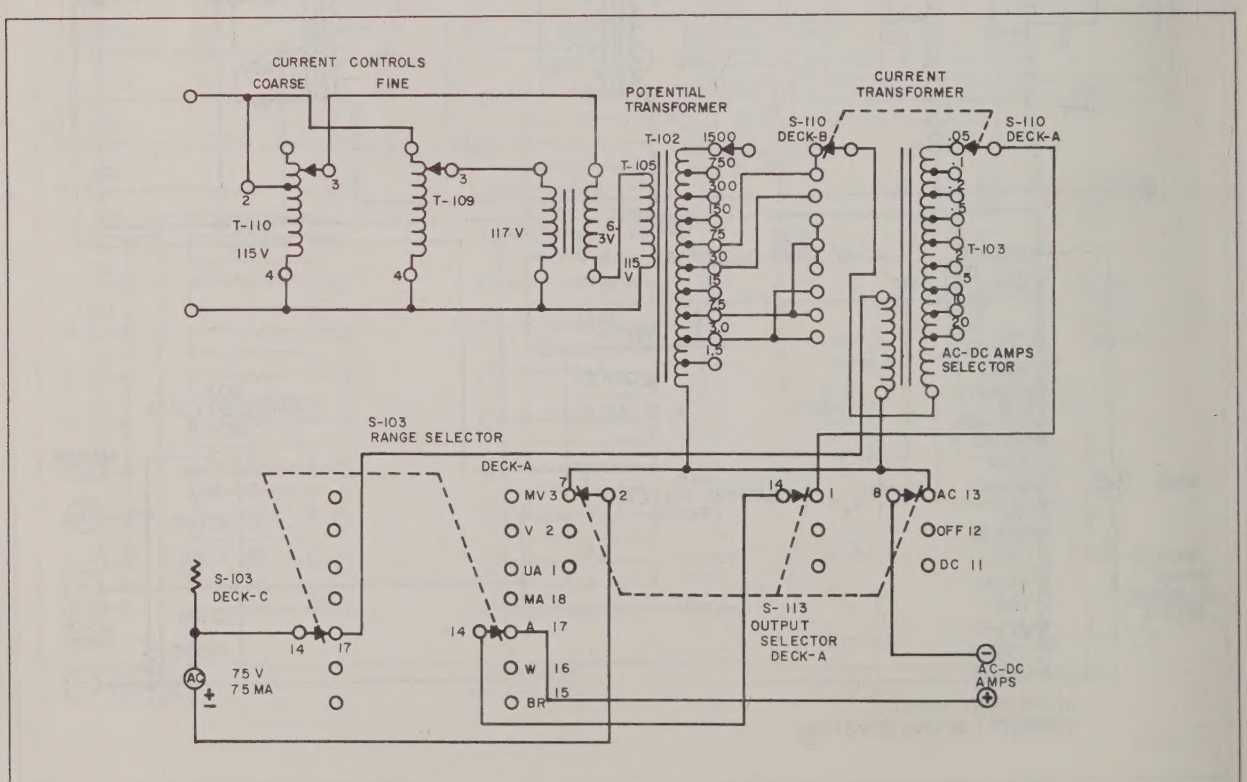

Figure 1-6. AC Ammeter Circuitry

1-19. When the POWER switch (2) is turned to ON, the green EQUIPMENT pilot lamp (31) lights. After 30 seconds the thermal time delay relay closes and applies power to the holding relay, which closes and applies power to the calibration standard if the VOLTAGE (26, 28) and CURRENT (8, 16) CONTROLS are at zero and their microswitches are closed. The microswitches open as the controls are moved upscale, but power is maintained on the equipment by the holding relay. Five microswitches attached to the shafts of the selector switches are in the coil circuit of the holding relay. A small movement of the shaft of any of these selector switches breaks the current in the holding relay coil, letting it drop out to remove the power from the equipment. The COARSE variac controls (16, 26) must then be returned to zero to energize the holding relay again.

1-20. The high voltage relay is normally closed and requires current to hold it open. Current is supplied through normally closed contacts of the microswitch on the COARSE voltage variac (26). At zero position of the variac this contact opens, stopping current flow through the high voltage relay. This switches a 10,000 ohm bleeder resistor across the high voltage capacitors and discharges them.

1-21. ADDITIONAL EQUIPMENT REQUIRED.

1-22. No additional equipment is required for the operation of the calibration standard.

1-23. MODEL DIFFERENCES.

1-24. There are no differences because there is only one model of the calibration standard.

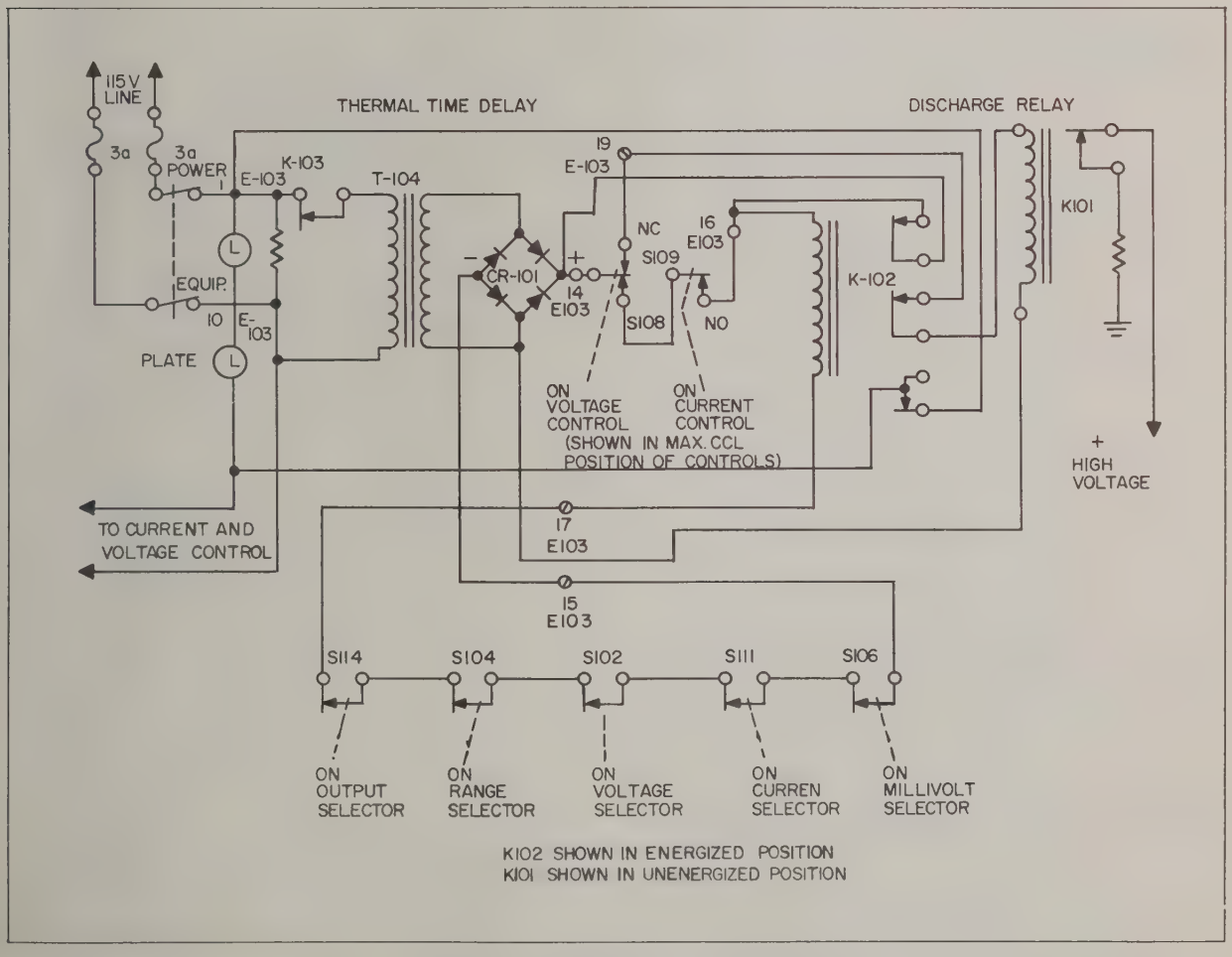

Figure 1-7. Control Circuit Schematic

SECTION II

SPECIAL SERVICE TOOLS

2-1. This section is not applicable because special tools are not required for servicing the calibrations standard.

SECTION III

PREPARATION FOR USE, STORAGE, AND SHIPMENT

3-1. PREPARATION FOR USE.

CAUTION

The calibration standard shall be checked according to section VII prior to use.

3-2. UNPACKING.

3-3. Proceed as follows:

a. Remove metal straps from packing box.

b. Remove top cover.

c. Remove tape from cushioning and remove top and side cushioning.

d. Remove one piece folder containing power cable.

e. List inner carton containing calibration standard from packing box.

f. Remove tape from carton.

g. Remove wadding inside carton.

h. Lift calibration standard from carton.

i. Remove power cable from folder.

3-4. ASSEMBLY.

3-5. Assembly instructions are not required because the calibration standard is assembled before shipment.

3-6. INSTALLATION.

3-7. The calibration standard can be placed on a bench or four wheeled cart. If it is to be operated from a non-variable power source (115 volts, 50 to 400 cycles), make connections as shown in figure 3-1. If the calibration standard is operated from a variable output power oscillator or a variable frequency source, ground the cabinet to an external ground and make power connections as shown in figure 3-2.

3-8. FACILITY REQUIREMENTS.

3-9. POWER REQUIREMENTS.

3-10. The calibration standard requires 115 (± 11.5) volt, 50 to 400 cycle, single phase power.

3-11. SPACE REQUIREMENTS.

3-12. The calibration standard occupies a floor area of five feet deep by six feet wide.

3-13. PREPARATION FOR STORAGE.

3-14. The calibration standard does not require special provisions during storage.

3-15. PREPARATION FOR SHIPMENT.

3-16. Proceed as follows:

a. Place two fiberboard sheets in bottom of carton which is slightly larger than calibration standard.

b. Tape one fiberboard sheet to front panel of calibration standard.

c. Place calibration standard into carton.

d. Stuff carton with wadding, close top, and seal with tape.

e. Place carton in cushion lined packing box.

f. Place cushioning on top of carton.

g. Place electrical cable into one piece folder and place folder on top of cushioning.

h. Nail top to packing box and strap box.

i. Mark and label packing box.

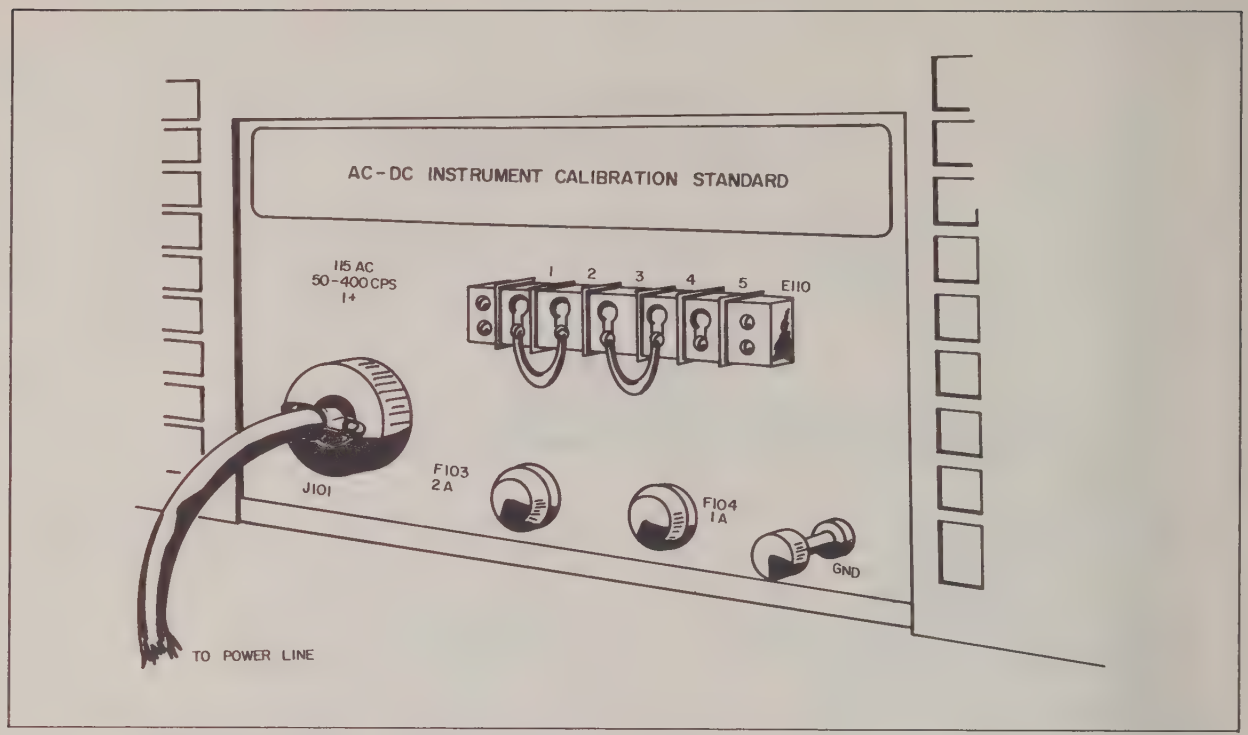

Figure 3-1. Non-Variable Frequency Power Source Connections

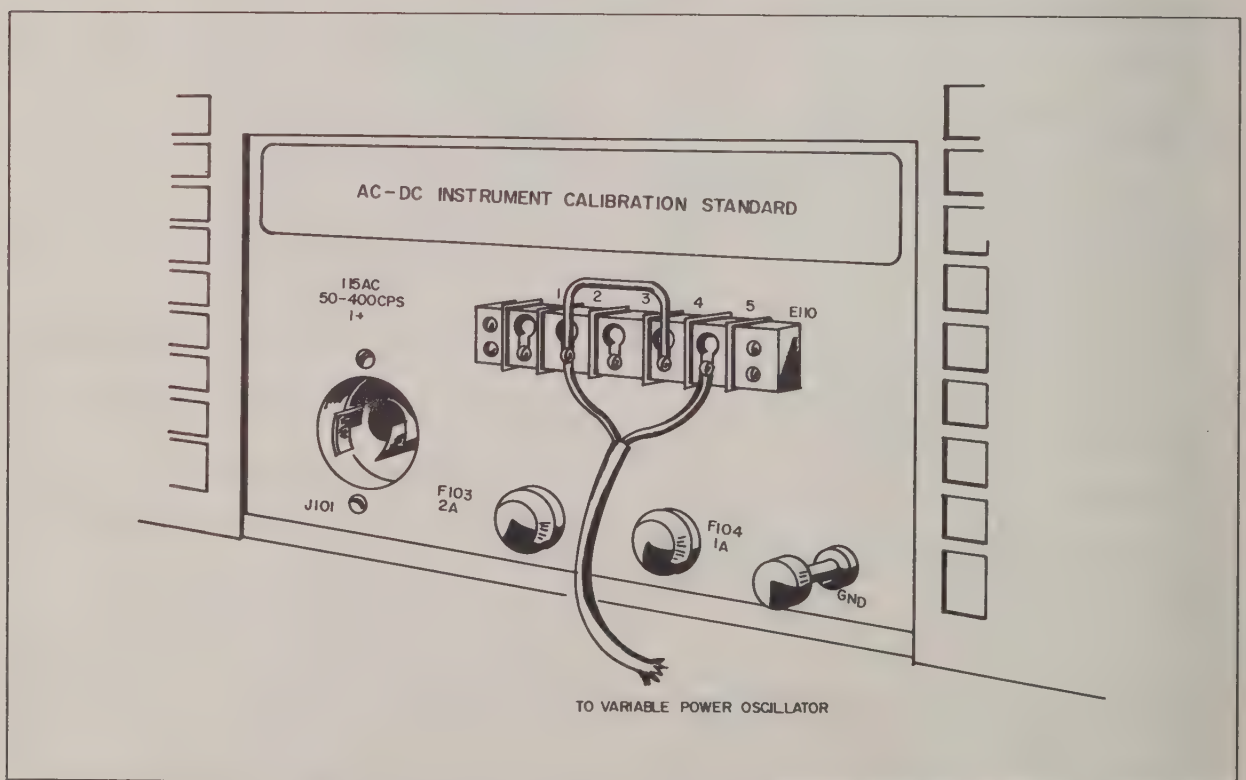

Figure 3-2. Variable Frequency Power Source Connections

SECTION IV

OPERATION INSTRUCTIONS

4-1. FUNCTIONS OF OPERATING CONTROLS, INDICATORS, AND TERMINALS.

4-2. Table 4-1 contains this information.

4-3. PRELIMINARY PROCEDURES.

4-4. Before operating the calibration standard, place the unit on a bench or four wheeled cart near the required power source. Provide sufficient space for the equipment to be tested. Check that the POWER switch (2, figure 1-2) is turned off.

4-5. If the calibration standard is to be operated from a nonvariable frequency power source, such as a conventional power line (50 to 400 cycles), connections are made at the rear of the calibration standard as shown in figure 3-1. If the equipment is to be operated from a variable frequency variable output power oscillator, connections are made as shown in figure 3-2. This connection by-passes the internal variacs and voltage control is accomplished at the power oscillator. The calibration standard must be connected to a good external ground. Fuses (F103 and F104, figure 3-1) are mounted on the rear panel and protect internal measuring circuits. The 3 ampere fuses on the front panel (30, figure 1-2) are EQUIPMENT fuses on the ac line.

4-6. Before operations, set the mechanical zeros of the AC and DC standard meters by means of the small screw on the instrument case. Tap the instrument lightly while making this adjustment.

Table 4-1. Functions of Operating Controls, Indicators, and Terminals (Sheet 1 of 2)

CONTROL	FIGURE 1-2 INDEX NO.	FUNCTION
POWER switch (S112)	2	Standard ON-OFF switch
EXT BAT switch (S116)	3	External Battery in-out switch for bridge
PUSH TO READ momentary switch (S115)	6	Push-to-read bridge switch
FINE current control (T109)	8	Current fine control
WATTS SELECTOR switch (S107)	9	Watts selector
OUTPUT switch (S113)	10	Output selector
RANGE SELECTOR (S103)	11	Range selector
AC-DC AMPS SELECTOR (S110)	12	AC-DC amps selector
COARSE current control (T110)	16	Current control coarse
1 ohm selector (R146)	17	Decade resistor
10 ohms selector (R145)	18	Decade resistor
RATIO selector (S117)	21	Bridge ratio setting switch
100 ohm selector (R144)	23	Decade resistor
1000 ohm selector (R143)	24	Decade resistor
COARSE voltage control (T108)	26	Voltage coarse control
AC-DC VOLTAGE SELECTOR (S101)	27	Voltage range selector

Table 4-1. Functions of Operating Controls, Indicators, and Terminals (Sheet 2 of 2)

CONTROL	FIGURE 1-2 INDEX NO.	FUNCTION
FINE voltage control (T107)	28	Voltage fine control
AC MILLIVOLTS SELECTOR (S105)	29	AC millivolts selector
AC standard voltage and current meter (M101)	4	AC standard meter
DC standard voltage and current meter (M102)	7	DC standard meter
DC microampere null meter (M103)	5	Bridge null indicator
PLATES pilot lamp (I101)	1	Plate supply pilot lamp
EQUIPMENT pilot lamp (I102)	31	Equipment pilot lamp
EXT GALV jack (J102)	20	External galvanometer jack
+ DC MV terminal	13	+ DC MV output terminal
- terminal	14	- AC-DC AMPS and DC MV output terminal
+ AC-DC AMPS terminal	15	+ AC-DC AMPS output terminal
EXT BAT terminals	19	+ and - external battery terminals
UNKNOWN (X1 and X2) terminals	22	Bridge terminals for unknown resistance
AC-DC current-voltage terminals	25	G and 1.5 or 3.0 volt terminals are used for 1.5 or 3.0 volt instruments with large current requirements. + and - terminals are used for calibrating: AC-DC VOLTS, AC-DC MA's and DC MA's.

4-7. DC OPERATING PROCEDURES.

4-8. RESISTANCE MEASUREMENT OF INSTRUMENT UNDER TEST.

4-9. If DC resistance of the instrument under calibration is unknown but is required for its calibration, proceed as follows:

a. Connect instrument to AC-DC MA terminals (25, figure 1-2).

b. Turn POWER switch (2) to ON.

c. Set RANGE SELECTOR (11) to MA position.

d. Set bridge decade for zero ohms.

e. Set OUTPUT (10) switch for DC.

f. Beginning at lowest AC-DC VOLTS SELECTOR (27) value, operate VOLTAGE CONTROLS (26,28) and apply enough voltage to bring instrument under test to full scale deflection.

g. Increase decade resistance using white knobs while holding voltage constant, until half scale reading is indicated on test equipment. Resistance indicated on decade dials is equal to resistance or impedance of instrument under test.

4-10. DC VOLTMETER CALIBRATION.

4-11. Proceed as follows:

a. Check that CURRENT (8 and 16, figure 1-2) and VOLTAGE (26, 28) CONTROLS are at zero (maximum counterclockwise position) and turn POWER switch (2) to ON.

b. Set RANGE SELECTOR (11) to VOLTS (.2 to 2000 DC).

c. Set AC-DC VOLTS SELECTOR (27) to desired range.

d. Connect instrument under calibration to AC-DC VOLTS terminals (25).

e. Set OUTPUT switch (10) to DC.

f. Operate VOLTAGE CONTROLS (26, 28) and check DC standard voltage and current meter (7) against instrument under calibration.

4-12. DC MILLIVOLT METER CALIBRATION.

4-13. Proceed as follows:

a. Turn POWER switch (2, figure 1-2) to ON.

b. Set RANGE SELECTOR (11) to MV.

c. Set AC-DC AMPS SELECTOR (27) to current indicated in table 4-2.

d. Connect instrument under calibration to DC MV terminals (13, 14).

e. Set OUTPUT switch (10) to DC.

f. Operate CURRENT CONTROLS (8, 16) and check DC standard voltage and current meter (7) against instrument under calibration.

4-14. DC AMMETER CALIBRATION.

4-15. Proceed as follows:

a. Turn POWER switch (2, figure 1-2) to ON.

b. Set RANGE SELECTOR (11) to AMPS (0.5 to 20 DC).

c. Set AC-DC AMPS SELECTOR (12) to desired range.

d. Connect instrument under calibration to AC-DC AMPS terminals (14, 15).

Table 4-2. Millivolt Range Data

CURRENT IN AMPERES	SHUNT VOLTAGE IN MILLIVOLTS
0.05	0.25
0.1	0.5
0.2	1.0
0.5	2.5
1.0	5.0
2.0	10.0
5.0	25.0
10.0	50.0
20.0	100.0

e. Set OUTPUT switch (10) to DC.

f. Operate CURRENT CONTROLS (8, 16) and check DC standard voltage and current meter (7) against instrument under calibration.

4-16. DC MILLIAMMETER CALIBRATION.

4-17. Proceed as follows:

a. Turn POWER switch (2, figure 1-2) to ON.

b. Set RANGE SELECTOR (11) to MA (1.0 to 20 DC).

c. Set AC-DC VOLTS SELECTOR (27) to voltage indicated in table 4-3.

d. Connect instrument under calibration to AC-DC MA terminals (25).

e. Set decade resistance (white knobs) so that total resistance of instrument under calibration plus decade resistance equals 10,000 ohms.

f. Set OUTPUT (10) switch to DC.

g. Operate VOLTAGE CONTROLS (26, 28) and check DC standard voltage and current meter (7) against instrument under calibration.

4-18. DC MICROAMMETER CALIBRATION.

4-19. Proceed as follows:

a. Turn POWER switch (2, figure 1-2) to ON.

b. Set RANGE SELECTOR (11) to DC μa (2 to 500 DC).

c. Set AC-DC VOLTS SELECTOR (27) to voltage indicated in table 4-4.

d. Connect instrument under calibration to DC μa terminals (25)

e. Set decade resistance (white knobs) so that total resistance of instrument under calibration plus decade resistance equals 10,000 ohms. (Total circuit resistance is 100,000 ohms for DC μa. See figure 1-3).

f. Set OUTPUT switch (10, figure 1-2) to DC.

Table 4-3. DC Milliampere Range Data

CURRENT IN MILLIAMPERES	VOLTS
1	10
2	20
5	50
10	100
20	200

Table 4-4. Microampere Range Data

CURRENT IN MICROAMPERES	VOLTS
2	0.2
5	0.5
20	2.0
50	5.0
200	20.0
500	50.0

g. Operate VOLTAGE CONTROLS (26, 28) and check DC standard voltage and current meter (7) against instrument under calibration.

4-20. ELECTRODYNAMIC WATTMETER CALIBRATION BY DC METHOD.

4-21. Proceed as follows:

a. Turn POWER switch (2, figure 1-2) to ON.

b. Set RANGE SELECTOR (11) to WATTS DC.

c. Set OUTPUT switch (10) to DC.

d. Set AC-DC AMPS SELECTOR (12) and AC-DC VOLTS SELECTOR (27) to desired voltage and current ranges.

e. Connect wattmeter potential and current coils to AC-DC VOLTS (25) and AC-DC AMPS (14, 15) terminals respectively observing polarity.

f. Alternately place WATTS SELECTOR (9) in VOLTS and AMPS position and operate VOLTAGE (26, 28) and CURRENT CONTROLS (8, 16) until desired range value is indicated on DC standard voltage and current meter (7) in each case. Product of volts times amperes equals watts.

g. Reverse potential and current leads and repeat procedure. Take average of both readings.

4-22. AC OPERATING PROCEDURES.

4-23. AC VOLTMETER CALIBRATION.

4-24. Proceed as follows:

a. Turn POWER switch (2, figure 1-2) to ON.

b. Set RANGE SELECTOR (11) to VOLTS (1.5 to 1500 AC).

c. Set AC-DC VOLTS SELECTOR (27) to desired range.

d. Connect instrument under calibration to AC-DC VOLTS terminals (25). (For 1.5 and 3.0 volt instruments with large current requirements, use G terminals and 1.5 and/or 3.0 volt terminal.)

e. Set OUTPUT switch (10) to AC.

f. Operate VOLTAGE CONTROLS (26, 28) and check AC standard voltage and current meter (4) against instrument under calibration.

4-25. AC MILLIVOLT CALIBRATION WITH VACUUM TUBE VOLTMETER.

4-26. Proceed as follows:

a. Turn POWER switch (2, figure 1-2) to ON.

b. Set RANGE SELECTOR (11) to MV (1.5 to 750 AC).

c. Set AC MILLIVOLTS SELECTOR (29) to desired range.

d. Connect instrument under calibration to AC MV terminals (25).

e. Set OUTPUT switch (10) to AC.

f. Operate VOLTAGE CONTROLS (26, 28) and check the AC standard voltage and current meter (4) against instrument under calibration

4-27. AC AMMETER CALIBRATION.

4-28. Proceed as follows:

a. Turn POWER switch (2, figure 1-2) to ON.

b. Set RANGE SELECTOR (11) to AMPS (.05 to 20 AC).

c. Set AC-DC AMPS SELECTOR (12) to desired range.

d. Connect instrument under calibration to AC-DC AMPS Terminals (14, 15).

e. Set OUTPUT switch (10) to AC.

f. Operate CURRENT CONTROLS (8, 16) and read AC standard voltage and current meter (4).

4-29. AC MILLIAMMETER CALIBRATION.

4-30. Proceed as follows:

a. Turn POWER switch to ON (2, figure 1-2).

Table 4-5. AC Milliampere Range Data

CURRENT IN MILLIAMPERES	AC VOLTS
1.5	15
3.0	30
7.5	75
15.0	150
30.0	300

b. Set RANGE SELECTOR (11) to MA (1.5 to 30 AC).

c. Set AC-DC VOLTS SELECTOR (27) as indicated in table 4-5.

d. Set decade resistance (white knobs) so that impedance of instrument under calibration plus decade resistance equals 10,000 ohms.

e. Connect instrument under calibration to AC-DC MA terminals (25).

f. Set OUTPUT switch (10) to AC.

g. Operate VOLTAGE CONTROLS (26, 28) and read AC standard voltage and current meter (4).

Table 4-6. Wheatstone Bridge Data

RESISTANCE	VOLTS DC
50 K to 2 megohms	20
2 to 4 megohms	50
4 to 10 megohms	100
10 to 11 megohms	200

4-31. WHEATSTONE BRIDGE OPERATION.

4-32. Proceed as follows:

a. Turn POWER switch (2, figure 1-2) to ON.

b. Set RANGE SELECTOR (27) to BRIDGE POSITION.

c. Turn EXT BAT switch (3) to OUT position.

d. Set RATIO switch (21) for desired multiplier.

e. Set decade (white knobs) to approximate resistance value of unknown.

f. Set OUTPUT SELECTOR (10) to DC.

g. Depress PUSH TO READ switch (6) and vary decade until zero is indicated on DC microampere null meter (5). Decade setting times multiplier equals unkown resistance.

h. For greater sensitivity for resistance values of 50,000 ohms and up, turn EXT BAT switch (3) to IN position and connect jumpers between AC-DC VOLTS terminals (25) and bridge EXT BAT terminals (19), observing polarity. Follow procedure for dc voltmeter calibration and apply voltage per table 4-6.

SECTION V

PERIODIC INSPECTION, MAINTENANCE, AND LUBRICATION

5-1. THREE MONTH INSPECTION.

5-2. The calibration standard should be inspected every 90 days, as follows:

a. Check calibration standard for burrs, chips, scratches, and rust.

b. Check calibration standard for dust accumulation and poorly secured components.

c. Check all front panel markings for legibility.

d. Check lamps I102 and I101 and fuses F101, F102, F103, and F104. Replace as necessary.

e. Check all switches and controls for proper operation.

f. Calibrate calibration standard as outlined in section VII.

5-3. MAINTENANCE.

5-4. The calibration standard does not require regular maintenance other than the scheduled inspection. In case of malfunction, perform the inspection procedures in this section, the troubleshooting procedures in section VI, and the calibration procedures in section VII.

5-5. Clean plastic front of standard meters (4 and 7, figure 1-2), using absorbent cotton dipped in solution of one-half teaspoon of detergent in one gallon of water. Allow solution to air dry and do not rinse with clear water.

5-6. LUBRICATION.

5-7. The calibration standard does not require lubrication.

SECTION VI
TROUBLESHOOTING

6-1. BASIC PROCEDURE.

6-2. Malfunctions of the calibration standard are usually due to blown fuses, poor connections, improper operational procedure, or faulty tubes, diodes, or relays. Check for such discrepancies, using the schematic diagram (figure 6-1), before proceeding to detailed troubleshooting.

6-3. TROUBLESHOOTING GUIDES.

6-4. Tables 6-1 and 6-2 list symptom, cause, and remedy of possible malfunctions which may be encountered. Use these tables in conjunction with the schematic diagram. (See figure 6-1.)

Table 6-1. Troubleshooting Guide for DC Section (Sheet 1 of 4)

SYMPTOM		CAUSE	REMEDY
DC VOLTS	No voltage output or no DC standard meter reading.	Improperly connected jumpers on E111	Check for proper connection of jumpers.
	I102 does not light	Blown fuse F101 or F102	Replace fuses as required.
		Faulty J101	Check and replace J101 if necessary.
		Faulty ON-OFF switch S112	Check and replace S112 if necessary.
	No voltage output, and pilot lamp I101 does not light.	Faulty thermal relay K103	Check resistance between contacts 2 and 3 (approx. 6000 ohms).
		Open interlock circuit	Check that both COARSE CONTROLS (16 and 26, figure 1-2) are fully counterclockwise. Check that all switch detents are fully seated. Check continuity of interlock switch circuits - should show short circuit from terminal #17 to terminal #20 of E103.
		Faulty transformer T104	Check T104 for primary resistance of 22 ohms, secondary resistance of less than 1 ohm; and secondary voltage of 15 volts.
		Faulty selenium rectifier CR101	Check AC volts for input of 15 volts. Check DC volts for output of 12 volts.
		Faulty relay K102	Check for 12 volts dc across coil when thermal delay relay closes. Check relay contacts.
	No voltage output and no DC standard meter (7) reading	Open fuse F104	Check and replace if necessary.

Table 6-1. Troubleshooting Guide for DC Section (Sheet 2 of 4)

SYMPTOM		CAUSE	REMEDY
DC VOLTS (Cont)		Relay K101 fails to open when COARSE VOLTAGE CONTROL (26) is rotated clockwise.	Check for 12 volts dc across relay coil when COARSE VOLTAGE CONTROL (26) is turned clockwise. If 12 volts dc is present across coil, check continuity of relay coil at approximately 26 ohms. Check relay for sticking contacts.
		Open interlock circuit	Disconnect calibration standard from line and check from 15 to 17 of E103 for continuity, with COARSE VOLTAGE (26) and CURRENT (16) CONTROLS at counterclockwise position. When all interlocks are closed, continuity exists between 14 and 16, no continuity between 14 and 19, and continuity between 15 and 17.
		Faulty 836 rectifier tube	Check and replace if necessary.
		Faulty filament transformer T101	Check for -15 volts to primary from 7 to 8 on E111. Check resistance of primary of T101. Disconnect black lead and black and red lead from rear of E111. Terminals 7 and 8 should show resistance of 42 ohms across these two leads.
		Shorted filter capacitors C101 and C102	Check and replace if necessary.
		Open contact in AC-DC VOLTS SELECTOR S101	Check continuity
		Short in AC-DC VOLTS SELECTOR S101	Disconnect one side of DC standard meter (7). Hold relay K101 open. From 19 of A deck S101 to minus volts terminal, resistances should read as follows: position of S101 -.2 to 100 volts, -1765 ohms; 200 to 2000 . ts.
	Voltage is present at output terminals, but DC standard meter (7) does not read	Faulty meter	Disconnect DC standard meter (7) from circuit and insert 1 MA dc meter in its place. If 1 MA meter reads as voltage controls are increased, DC standard meter (7) is defective.
		Open multiplier	Disconnect one side of DC standard meter (7) and check resistance of multiplier.
		Faulty switching circuits	Disconnect one side of DC standard meter (7). Check S101 for open contacts as short circuit to ground.
	DC standard meter (7) reads, but no voltage is present at voltage output terminals.	Faulty switching circuits	Open contact on wiring in S101, S103, or S113. A check should show continbetween 19 B deck S102 and positive voltage output terminals.

Table 6-1. Troubleshooting Guide for DC Section (Sheet 3 of 4)

SYMPTOM		CAUSE	REMEDY
DC MILLI-AMPERES	No current at MA output terminals. No DC standard meter (7) reading.	Check as under DC VOLTS	
	Current at current output terminals but DC standard meter (7) does not read.	Check as under DC VOLTS	
	DC standard meter (7) reads, but there is no current at output terminals.	Faulty switching circuits	Check contacts in S113 and S103.
		Open decade resistor	Check resistance decades.
DC MICRO-AMPERES	Same as under DC MILLIAMPERES.	Same as under DC MILLIAMPERES plus open 90K resistor R147	Check R147 as applicable.
DC CURRENT .05 -20 AMPERES	No current present at current terminals. DC standard meter (7) does not read.	Faulty interlocks	Check and replace if necessary.
		Blown fuse F103	Check for 8 volts dc on terminal board E111 from 1 to 2.
		Faulty current supply circuit	Check for 12 volts ac from 3 to 4 of E111. Check for continuity and for short circuit to chassis in choke L102.
			Check C104 and C108 for short circuit.
			Check for 115 volts ac at 6 to 8 of E111.
			Disconnect leads from T111 going to 6 and 8 of E111. Resistance across these leads should be approximately 2 ohms.
		Faulty switch circuit	Check S113 and S103.
		Faulty shunt E104	Check and replace with new shunt. Do not attempt to repair. Return shunt to factory for repairs.
		Faulty current limiting resistors, .05 to 5 amp position.	Check resistors R135 through R141 and replace if defective.
DC WATTS	No DC standard meter (7) reading and no output.	Voltage or current sections inoperative	Check as under DC VOLTAGE and DC CURRENT.
	Output is present at terminals, but DC standard meter (7) does not read in either position of WATTS SELECTOR S107	Faulty WATTS SELECTOR S107	Check contacts of S107.
		Faulty voltage measuring circuit	Check as under DC VOLTS
		Faulty current measuring circuit	Check as under DC CURRENT.

Table 6-1. Troubleshooting Guide for DC Section (Sheet 4 of 4)

SYMPTOM		CAUSE	REMEDY
DC MILLI-VOLTS	No output and no DC standard meter (7) reading.	Same as under DC CURRENT	Same as under DC CURRENT.
		Faulty millivolt shunt E112 or switching circuit of S103	Check connection of millivolt shunt E112. Check continuity of S103. Replace defective component.
BRIDGE	No reading	Faulty AC power supply circuit	Check as per DC Current troubles.
		Check for presence of 8 volts dc across 2 and 6 of E103	If voltage is present, supply is operating. If no voltage, check continuity through S103 and S113 back to CR102 and T111.
		Meter	Check null indication as microammeter using calibration standard equipment.
	DC null meter shows excessive deflection with any setting at decade and/or ratio dial.	Open decade or ratio coil.	Check decade and coils for continuity. Replace defective component.
		Defective or dirty switch contacts	Repair, clean or replace. Check S117 and S115. Check J102 and clean contacts if necessary.
	No external galvanometer reading. Internal galvanometer reads properly.	Faulty J102	Check J102 and clean contacts. Replace J102 if necessary.

Table 6-2. Troubleshooting Guide for AC Section (Sheet 1 of 3)

SYMPTOM		CAUSE	REMEDY
AC VOLTS	No voltage output, no AC standard meter (4) reading and I102 does not light.	Improperly connected jumpers on E111.	Check for proper connection of jumpers.
		Blown fuse F101, F102.	Replace fuse.
		Faulty switch S112.	Check and replace if necessary.
		Faulty J101.	Check and replace if necessary.
	No voltage output. Pilot lamp I101 does light.	Faulty thermal delay relay K103	Check resistance between contacts 2 and 3 and measure heater resistance at approximately 6000 ohms.
		Open interlock circuit.	Check that both COARSE CONTROLS are fully counterclockwise.
			Check that all switch detents are fully seated.
			Check continuity of interlock switch circuits; should show short circuit from terminal 17 to terminal 20 of E103.

Table 6-2. Troubleshooting Guide for AC Section (Sheet 2 of 3)

SYMPTOM		CAUSE	REMEDY
AC VOLTS (Cont)		Faulty transformer T104.	Check T104 for Primary resistance of 22 ohms, secondary resistance of less than 1 ohm, and secondary voltage of 15 volts.
		Faulty selenium rectifier CR101.	Check AC volts for input of 15 volts. Replace if defective.
			Check DC volts for output of 12 volts.
		Faulty relay K102.	Check for 12 volts dc across coil when thermal delay relay closes. Check relay contacts.
	No voltage output. No AC standard meter (4) reading.	Blown F104.	Check and replace if necessary.
		Faulty Potential transformer T102.	Check continuity across primary (115-115). Check resistance of primary of potential transformer at approximately 1 ohm. Replace if defective.
		Switching Circuit.	Check continuity of S103 and S113.
	AC Standard meter (4) reads, but no voltage across output terminals.	Switching circuit	Check S103 and S113.
	Voltage is at output terminals, but AC standard meter (4) does not read.	Meter circuit	CAUTION Extremely high voltages are present on other terminals of this transformer. Exercise extreme care in this check. Check for 75 volts at 75 volt tap of T102 with power applied to primary.
			Check AC standard meter (4) M102.
			Check meter switching circuits S103 and S113.
AC CURRENT	No current at output terminals. No AC standard meter (4) reading.	Defective potential transformer T102.	Check for input and output voltages of T102.
			Check resistance of primary of T102 at approximately 1 ohm.
			Check continuity of secondaries of T102, 1.5 to 75 volt range.
		Faulty switching circuit.	Check S103, S110, and S113.
			Check primary of T103 for open circuit.
		Faulty current transformers.	20 to 1 amperes taps should have less than 1 ohm.

Table 6-2. Troubleshooting Guide for AC Section (Sheet 3 of 3)

SYMPTOM		CAUSE	REMEDY
AC CURRENT (Cont)			0.2 ampere tap should have approximately 6 ohms.
			0.1 ampere tap should have approximately 8 ohms.
			0.05 ampere tap should have approximately 60 ohms.
	Little or no current at output terminals but AC standard meter (4) reads.	Faulty current transformers	Short circuit in primary of current transformer. Check resistance as under AC Current. Faulty current transformers should be replaced.
		Short circuit across current output terminals.	Correct short circuit.
	Current at output terminals, but AC standard meter (4) does not read.	Defective meter.	Check and replace if necessary
		Defective current transformer	Check meter winding (secondary) of T103 for resistance of 22 ohms.
AC MILLIVOLTS	No voltage at output and no AC standard meter (4) reading.	Same cause as step one of AC Volts.	
	Voltage present at output terminals, but no AC standard meter (4) reading.	Potential transformers	Check continuity and voltage output of 75 volt winding of T102.
		Meter circuits.	Check S103 switching circuits for continuity or short circuits.
		Defective meter.	Check meter and replace if necessary.
	AC standard meter (4) reads, but no voltages at AC millivolt terminals.	Open voltage divider.	Check R124 through R133 and replace if necessary.
		Defective AC MILLIVOLTS switch S106.	Check contacts and wiring.
		Faulty switching circuits.	Check contacts and wiring of S103, S113, and S106.
AC MILLIAMPERES	Meter reads, but no output at terminals.	Open decade resistance.	Check decade resistances and replace if necessary.
	For all other symptoms, check as under AC voltage.		

SECTION VII
CALIBRATION

7-1. CALIBRATION SCHEDULE.

7-2. The calibration standard shall be calibrated every thirteen weeks at 60 cycles and at 400 cycles utilizing the equipment and procedures listed in this section. If problems develop during calibration, refer to Section VI.

7-3. EQUIPMENT REQUIRED.

7-4. The following equipment, or its equivalent, is required for calibration:

a. Amplifier and null detector, General Radio 1231B.

b. Bridge transformer, Gertsch ST-100.

c. Decade resistors, General Radio 1432N and 1432P.

d. Decade voltage divider, General Radio 1454A.

e. Galvanometer, Rubicon 3401.

f. Galvanometer transformer, Rubicon 3440.

g. Type 2 instrument calibration standard, Weston 61.

h. K-3 potentiometer, Leeds and Northrup 7553.

i. Shunt box, Leeds and Northrup 4385.

j. Standard cell, Weston 4.

k. Standard ratio transformer, Gertsch RT-5.

l. Voltage regulator, Sorenson 50000S.

m. Voltage transfer standard, Hermach-Engelhard.

n. Volt box, Leeds and Northrup 7592.

o. Working cell, 2 volt, 144 ampere hour.

7-5. DC CALIBRATION PROCEDURES.

7-6. The input voltage to the calibration standard should be 115 volts ac during calibration. Connect the calibration standard to the voltage regulator per figure 7-1.

7-7. Connect the test equipment to a 115 volt 60 cycle source and allow one hour warm-up time. Do not disturb the standard cell for at least three hours before using and do not disturb it during calibration.

NOTE

Calibration standard VOLTAGE and CURRENT CONTROLS must be set at extreme counter-clockwise positions when connecting or disconnecting test equipment.

7-8. DC VOLTAGE CALIBRATION.

7-9. Proceed as follows:

a. Connect galvanometer 6 volt input connector, on left-hand side, to galvanometer transformer output connector.

b. Adjust lever on top of galvanometer until it indicates as close to zero as possible.

c. Adjust thumb screw, located on upper right-hand side of galvanometer until it indicates exactly 0.

d. Connect calibration standard to test equipment. (See figure 7-2.)

e. Set K3 potentiometer SC control to standard cell voltage as indicated on tag supplied with standard cell being used.

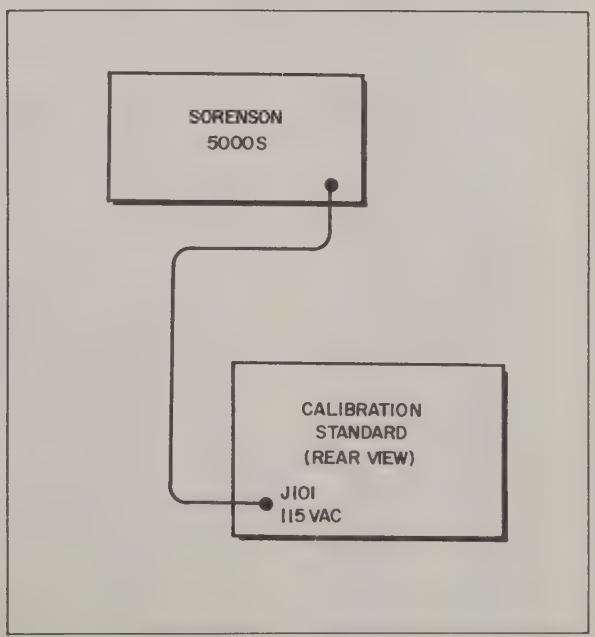

Figure 7-1. Constant Input Calibration Connections

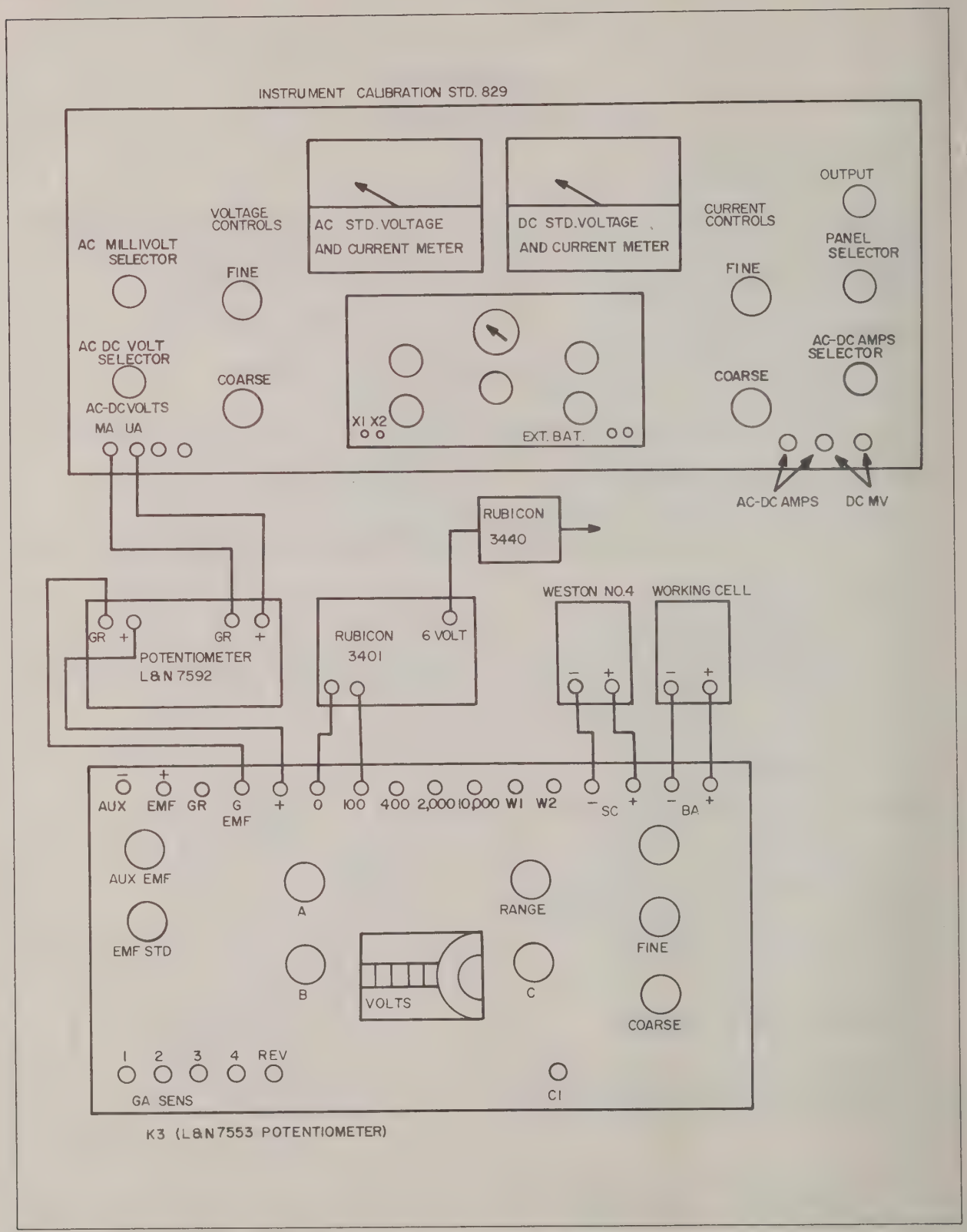

Figure 7-2. DC Voltage Test Equipment Diagram

f. Set K3 potentiometer EMF-STD-REV EMF-STD switch to either of STD positions.

g. Adjust K3 potentiometer COARSE switch while tapping GA SENS key 1 until reverse of null current is indicated on galvanometer.

h. Adjust K3 potentiometer FINE control while tapping GA SENS keys 2, 3, and 4 respectively, until galvanometer indicates no deflection while tapping SENS key 4.

i. Lock K3 potentiometer GA SENS key 4 by pressing in and rotating slightly clockwise. Adjust FINE control while tapping GA SENS REV Key until galvanometer indicates no deflection.

j. Release K3 potentiometer GA SENS key 4 and set EMF-STD-REV EMF-STD switch to EMF.

NOTE

Periodically check galvanometer null for drift and adjust fine control if necessary.

k. Rotate K3 potentiometer A, B, and C controls to extreme clockwise positions.

l. Adjust K3 potentiometer RANGE switch until VOLT window indicates 1.61100.

m. Set calibration standard RANGE SELECTOR (11, figure 1-2) to DC range and OUTPUT switch (10) to DC.

n. Set volt box RANGE switch to positions listed in VOLTS column of table 7-1.

o. Set calibration standard AC-DC VOLTS SELECTOR (27) to positions listed in RANGE column of table 7-1.

p. Adjust calibration standard VOLTAGE CONTROLS COARSE (26), and FINE (28) until calibration standard DC standard meter (7) indicates values listed in METER column of table 7-1.

q. Adjust K3 potentiometer A switch counterclockwise while tapping GA SENS key 1 until galvanometer deflection reverses. Then rotate K3 potentiometer A switch one step clockwise.

r. Repeat step o using K3 potentiometer B switch.

s. Adjust K3 potentiometer C control counterclockwise while tapping GA SENS keys 1, 2, 3, and 4, respectively, until galvanometer indicates no deflection.

t. If null indication reversal has not occurred, set K3 potentiometer EMF-STD-REV EMF-STD switch to REV EMF and repeat steps q, r, and s. K3 potentiometer VOLT window should indicate within values listed in LIMITS column of table 7-1.

u. Set calibration standard OUTPUT switch (10) to OFF and VOLTAGE CONTROLS COARSE (26) and FINE (28) fully counterclockwise.

v. Disconnect volt box and K3 potentiometer from calibration standard.

7-10. DC MILLIVOLT CALIBRATION.

7-11. Proceed as follows:

a. Connect K3 potentiometer EMF G terminal to calibration standard DC MV-(negative) terminals (25).

b. Connect K3 potentiometer EMF + (positive) terminal to calibration standard DC MV - (negative) terminal (25).

Table 7-1. DC Voltage Calibration Data

VOLTS	RANGE	METER READING	LIMITS
3.0 to 20	2	20 (on 0 to 20 scale)	0.099750 to 0.100250
7.5 to 50	5	50 (on 0 to 50 scale)	0.099750 to 0.100250
15 to 100	10	100 (on 0 to 100 scale)	0.099750 to 0.100250
15 to 100	10	90 (on 0 to 100 scale)	0.089750 to 0.090250
15 to 100	10	80 (on 0 to 100 scale)	0.079750 to 0.080250
7.5 to 50	10	70 (on 0 to 100 scale)	0.139500 to 0.140500
7.5 to 50	10	60 (on 0 to 100 scale)	0.119500 to 0.120500
7.5 to 50	10	50 (on 0 to 100 scale)	0.099500 to 0.100500
7.5 to 50	10	40 (on 0 to 100 scale)	0.099500 to 0.100500
3 to 20	10	30 (on 0 to 100 scale)	0.079500 to 0.0800500
3 to 20	10	20 (on 0 to 100 scale)	0.148750 to 0.151250
3 to 20	10	10 (on 0 to 100 scale)	0.098750 to 0.101250
30 to 200	20	20 (on 0 to 20 scale)	0.099750 to 0.100250
75 to 500	50	50 (on 0 to 50 scale)	0.099750 to 0.100250
150 to 1000	100	100 (on 0 to 100 scale)	0.099750 to 0.100250
300 to 2000	200	20 (on 0 to 20 scale)	0.099750 to 0.100250
750 to 5000	500	50 (on 0 to 50 scale)	0.099750 to 0.100250
750 to 5000	1000	75 (on 0 to 100 scale)	0.149500 to 0.150500
750 to 5000	2000	7.5 (on 0 to 20 scale)	0.149000 to 0.151000

c. Rotate K3 potentiometer A, B, and C controls to extreme clockwise positions.

d. Adjust K3 potentiometer RANGE switch until VOLT window indicates 1.5999.

e. Set calibration standard RANGE SELECTOR (11, figure 1-2) to MV and OUTPUT switch (10) to DC.

f. Set calibration standard AC-DC AMPS SELECTOR (12) to positions listed in RANGE column of table 7-2.

g. Adjust calibration standard CURRENT CONTROLS COARSE (16) and FINE (8) until DC standard meter (7) indicates values listed in METER column of table 7-2.

h. Repeat steps q, r, s, and t of paragraph 7-9 for each check in table 7-2.

i. Rotate K3, potentiometer A, B, and C controls to extreme clockwise positions before each check in table 7-2. K3 potentiometer VOLT window must indicate within values listed in LIMITS column of table 7-2.

j. Disconnect K3 potentiometer from calibration standard.

k. Connect K3 potentiometer EMF G terminal to calibration standard AC-DC VOLTS - (negative) terminal (25) and connect K3 potentiometer EMF + (positive) terminal to AC-DC VOLTS + (positive) terminal (25).

l. Rotate K3 potentiometer A, B, and C controls to extreme clockwise positions.

m. Adjust K3 potentiometer RANGE switch until VOLTS window indicates 1.5999.

n. Set calibration standard RANGE SELECTOR (11) to VOLTS and set OUTPUT switch (10) to DC.

o. Set calibration standard AC-DC VOLTS SELECTOR (27) to positions in RANGE column of table 7-3.

p. Adjust calibration standard COARSE and FINE VOLTAGE CONTROLS (26 and 28) until calibration standard DC standard meter (7) indicates values listed in METER column of table 7-3.

q. Repeat steps q, r, s, and t of paragraph 7-9 for each check in table 7-3.

r. Rotate K3 potentiometer A, B, and C controls to extreme clockwise positions for each check in table 7-3. K3 potentiometer VOLT window must indicate within values in LIMITS column of table 7-3.

s. Set calibration standard OUTPUT switch (10) to OFF.

t. Set calibration standard COARSE and FINE VOLTAGE CONTROLS (26 and 28) to extreme counterclockwise position.

u. Disconnect K3 potentiometer from calibration standard.

7-12. DC AMPERE CALIBRATION.

7-13. Proceed as follows:

a. Connect calibration standard AC-DC AMPS - (negative) terminal (14, figure 1-2) to shunt box LINE GRN terminal and connect calibration standard AC-DC AMPS + (positive) terminal (15) to shunt box LINE + (positive) terminal.

Table 7-2. Current Data for DC Millivolt Calibration

RANGE	METER READING	LIMITS
0.05	50 (on 0 to 50 scale)	0.0002494 to 0.0002506
0.1	100 (on 0 to 100 scale)	0.0004988 to 0.0005012
0.2	20 (on 0 to 20 scale)	0.0009975 to 0.0010025
0.5	50 (on 0 to 50 scale)	0.0024938 to 0.0025063
1.0	100 (on 0 to 100 scale)	0.0049875 to 0.0050125
2.0	20 (on 0 to 20 scale)	0.0099750 to 0.0100250
5.0	50 (on 0 to 50 scale)	0.0249375 to 0.0250625
10.0	100 (on 0 to 100 scale)	0.0498750 to 0.0501250
20.0	20 (on 0 to 20 scale)	0.0997500 to 0.1002500

Table 7-3. Voltage Data for DC Millivolt Calibration

RANGE	METER READING	LIMITS
0.2	20 (on 0 to 20 scale)	0.199500 to 0.200500
0.5	50 (on 0 to 50 scale)	0.498750 to 0.501250
1.0	100 (on 0 to 100 scale)	0.997500 to 1.002500

Table 7-4. DC Ampere Calibration Data

RANGE	SHUNT	METER READING	LIMITS
0.05	.075/.5	50 (on 0 to 50 scale)	0.099750 to 0.100250
0.1	.15/1	100 (on 0 to 100 scale)	0.099750 to 0.100250
0.2	.3/2	20 (on 0 to 20 scale)	0.099750 to 0.100250
0.5	.75/5	50 (on 0 to 50 scale)	0.099750 to 0.100250
1.0	1.5/10	100 (on 0 to 100 scale)	0.099750 to 0.100250
2.0	3/20	20 (on 0 to 20 scale)	0.099750 to 0.100250
5.0	7.5/50	50 (on 0 to 50 scale)	0.099750 to 0.100250
10.0	15/100	100 (on 0 to 100 scale)	0.099750 to 0.100250
20.0	15/100	20 (on 0 to 20 scale)	0.149500 to 0.150500

Table 7-5. DC Milliampere Calibration Data

RANGE	METER READING	DECADE	LIMITS
10	100 (on 0 to 100 scale)	0.1000	0.997500 to 1.002500
20	20 (on 0 to 20 scale)	0.0100	0.199500 to 0.200500
50	50 (on 0 to 50 scale)	0.0100	0.498750 to 0.501250
100	100 (on 0 to 100 scale)	0.0100	0.997500 to 1.002500
200	20 (on 0 to 20 scale)	0.0010	0.199500 to 0.200500

b. Connect shunt box POTENTIOMETER GRD terminal to K3 potentiometer EMF G terminal and connect shunt box POTENTIOMETER + (positive) terminal to K3 potentiometer + (positive) terminal.

c. Rotate K3 potentiometer A, B, and C controls to extreme clockwise positions.

d. Adjust K3 potentiometer RANGE switch until its VOLT window indicates 1.5999.

e. Set calibration standard RANGE SELECTOR (11) to AMPS.

f. Set calibration standard OUTPUT switch (10) to DC.

g. Set shunt box range switch to positions in SHUNT column of table 7-4.

h. Set calibration standard AC-DC AMPS SELECTOR (12) switch to positions in RANGE column of table 7-4.

i. Adjust calibration standard CURRENT CONTROLS COARSE (16) and FINE (8) until DC standard meter (7) indicates values listed in METER column of table 7-4.

j. Repeat steps q, r, s, and t of paragraph 7-9 for each check of table 7-4.

k. Rotate K3 potentiometer A, B, and C controls to extreme clockwise position for each check in table 7-4. K3 potentiometer VOLT window must indicate within values of LIMITS column of table 7-4.

l. Set calibration standard OUTPUT switch (10) to OFF.

m. Set calibration standard CURRENT CONTROLS COARSE (16) and FINE (8) to counterclockwise position.

n. Disconnect shunt box from calibration standard and K3 potentiometer.

7-14. DC MILLIAMPERE CALIBRATION.

7-15. Proceed as follows:

a. Connect calibration standard AC-DC VOLTS - (negative) terminal (25, figure 1-2) to decade voltage divider input black terminal. Connect AC-DC VOLTS + (positive) terminal (25) to decade voltage divider input red terminal.

b. Connect K3 potentiometer EMF G terminal to decade voltage divider OUTPUT black terminal and connect EMF + (positive) terminal to decade voltage divider output red terminal.

c. Rotate K3 potentiometer A, B, and C controls to extreme clockwise position.

d. Set K3 potentiometer RANGE switch until VOLT window indicates 1.5999.

e. Set calibration standard RANGE SELECTOR (11) to MA.

f. Set calibration standard OUTPUT switch (10) to DC.

g. Set decade voltage divider switches to positions listed in DECADE column of table 7-5.

h. Set calibration standard AC-DC VOLTS SELECTOR (27) to positions listed in RANGE column of table 7-5.

i. Adjust calibration standard VOLTAGE CONTROLS COARSE (26) and FINE (28) until DC standard meter (7) indicates values in METER column of table 7-5. K3 potentiometer VOLT window must indicate within values of LIMITS column of table 7-5.

j. Set calibration standard OUTPUT switch (10) to OFF.

k. Rotate VOLTAGE CONTROLS COARSE (26) and FINE (28) to counterclockwise position.

7-16. DC MICROAMPERE CALIBRATION.

7-17. Proceed as follows:

a. Connect calibration standard AC-DC VOLTS -(negative) terminal (25, figure 1-2) to decade voltage divider input black terminal. Connect AC-DC VOLTS + (positive) terminal (25) to decade voltage divider input red terminal.

b. Connect K3 potentiometer EMF G terminal to decade voltage divider OUTPUT black terminal and connect EMF + (positive) terminal to decade voltage divider output red terminal.

c. Rotate K3 potentiometer A, B, and C controls to extreme clockwise position.

d. Set K3 potentiometer RANGE switch until VOLT window indicates 1.5999.

e. Set calibration standard RANGE SELECTOR (11) to DC μa.

f. Set calibration standard OUTPUT switch (10) to DC.

g. Set decade voltage divider decade switches to position in DECADE column of table 7-6.

h. Set calibration standard AC-DC VOLTS SELECTOR (27) to position in RANGE column of table 7-6.

i. Adjust calibration standard VOLTAGE CONTROLS COARSE (26) and FINE (28) until DC standard meter (7) indicates values in METER column of table 7-6.

j. Repeat steps q, r, s, and t of paragraph 7-9 for each check on table 7-6.

k. Rotate K3 potentiometer A, B, and C controls to extreme clockwise positions for each check in table 7-6. K3 potentiometer VOLT window must indicate values within LIMITS column of table 7-6.

l. Set calibration standard OUTPUT switch (10) to OFF.

m. Set calibration standard VOLTAGE CONTROLS COARSE (26) and FINE (28) to counterclockwise positions.

n. Disconnect calibration standard and K3 potentiometer from decade voltage divider.

7-18. AC CALIBRATION PROCEDURES.

7-19. AC VOLTAGE CALIBRATION.

7-20. Proceed as follows:

a. Connect calibration standard AC-DC VOLTS - (negative) terminal (25, figure 2-1) to voltage transfer standard INPUT G terminal.

b. Connect calibration standard AC-DC VOLTS + (positive) terminal (25) to voltage transfer standard Model C INPUT red terminal.

c. Set the voltage transfer standard RANGE to 1, SELECTOR to No. 1 TC-AC, and BATTERY to ON.

d. Rotate K3 potentiometer A, B, and C controls to extreme clockwise positions.

e. Adjust K3 potentiometer RANGE switch until its VOLT window indicates 1.5999.

f. Set calibration standard RANGE SELECTOR (11) to VOLTS.

g. Set calibration standard OUTPUT switch (10) to AC.

Table 7-6. DC Microampere Calibration Data

RANGE	METER READING	DECADE	LIMITS
0.2	20 (on 0 to 20 scale)	.1000	0.019950 to 0.020050
0.5	50 (on 0 to 50 scale)	.1000	0.049875 to 0.050125
1.0	100 (on 0 to 100 scale)	.1000	0.099750 to 0.100250
2.0	20 (on 0 to 20 scale)	.1000	0.199500 to 0.200500
5.0	50 (on 0 to 50 scale)	.1000	0.498750 to 0.501250
10.0	100 (on 0 to 100 scale)	.1000	0.997500 to 1.002500
20.0	20 (on 0 to 20 scale)	.0100	0.199500 to 0.200500
50.0	50 (on 0 to 50 scale)	.0100	0.498750 to 0.501250

Table 7-7. AC Voltage Calibration Data

STD	RANGE	METER READING	LIMITS
1.5	1.5	150 (on 0 to 150 scale)	1.49625 to 1.50375
3.0	3.0	30 (on 0 to 30 scale)	1.49625 to 1.50375
3.0	3.0	25 (on 0 to 30 scale)	1.24813 to 1.25188
3.0	3.0	20 (on 0 to 30 scale)	0.99813 to 1.00188
1.5	3.0	15 (on 0 to 30 scale)	1.49250 to 1.50750
1.5	3.0	10 (on 0 to 30 scale)	0.99750 to 1.00750
0.5	3.0	5 (on 0 to 30 scale)	0.49250 to 0.50750
7.5	7.5	75 (on 0 to 75 scale)	1.49625 to 1.50375
15.0	15.0	150 (on 0 to 150 scale)	1.49625 to 1.50375
30.0	30.0	30 (on 0 to 30 scale)	1.49625 to 1.50375
75.0	75.0	75 (on 0 to 75 scale)	1.49625 to 1.50375
150.0	140.0	150 (on 0 to 150 scale)	1.49625 to 1.50375
750.0	750.0	75 (on 0 to 75 scale)	1.49625 to 1.50375
1500.0	1500.0	105 (on 0 to 150 scale)	1.49625 to 1.50375

h. Set voltage transfer standard RANGE switch to position in STD column of table 7-7.

i. Set voltage transfer standard SELECTOR switch to no. 1 TC-AC.

j. Set calibration standard AC-DC VOLTS SELECTOR switch (27) to positions in RANGE column of table 7-7.

k. Set voltage transfer standard GALV - (negative) SENS switch to LO and adjust No. 1 COARSE control until its galvanometer indicates 0.

l. Set voltage transfer standard GALV - (negative) SENS switch to HI and adjust No. 1 FINE ADJ control until galvanometer indicates 0.

m. Set voltage transfer standard SELECTOR switch to No. 2 TC-DC CAL and GALV - (negative) SENS switch to LO.

n. Adjust voltage transfer standard No. 2 COARSE ADJ control, until galvanometer indicates 0.

o. Set voltage transfer standard GALV - (negative) SENS switch to HI and adjust No. 2 FINE ADJUST control until galvanometer indicates 0.

p. Adjust K3 potentiometer A switch counterclockwise while tapping GA SENS Key 1 until galvanometer deflection reverses, then rotate K3 potentiometer A switch one step clockwise.

q. Repeat step p, using K3 potentiometer B switch.

r. Adjust K3 potentiometer control counterclockwise while tapping its GA SENS Keys 1, 2, 3, and 4 respectively, until galvanometer indicates no deflection.

s. If null indication reversal has not occurred, set K3 potentiometer EMF-STD-REV EMF-STD switch to REV EMF and repeat steps p, q, and r. K3 potentiometer VOLT window should indicate within values in LIMITS column of table 7-1.

t. Repeat steps i, k, l, m, n, o, and p each time steps h and j are performed in table 7-7. K3 potentiometer VOLT window must indicate within values in LIMITS column of table 7-7.

u. Set calibration standard OUTPUT switch (10) to OFF.

v. Set calibration standard AC-DC VOLTAGE and CURRENT CONTROLS to counterclockwise position.

w. Disconnect calibration standard from voltage transfer standard.

7-21. AC MILLIVOLT CALIBRATION.

7-22. Proceed as follows:

a. Set type 2 instrument calibration standard DIVIDE FULL SCALE VOLTS control to 0-20-0. Set 0-150 +1/2 (toggle switch) to 0 and 0-300 +1/2 (toggle switch) to 0. Set OUTPUT RANGE (left-hand) to .75 to 30 and OUTPUT RANGE (right-hand) to .75. Set SET MONITOR to counterclockwise. Set ON switch to OFF (down).

b. Set standard ratio transformer switches to .0150000.

c. Set voltage transfer standard Model C controls to RANGE .1, SELECTOR No. 1 TC-AC, and BATTERY to ON.

d. Set K3 potentiometer EMF-STD-REV EMF-STD switch to either of STD positions.

e. Adjust K3 potentiometer COARSE switch while tapping GA SENS key 1 until reverse of null current is indicated on galvanometer.

f. Adjust K3 potentiometer FINE control while tapping GA SENS keys 2, 3, and 4 respectively, until galvanometer indicates no deflection when tapping SENS key 4.

g. Lock K3 potentiometer GA SENS key 4 by pressing in and rotating slightly clockwise. Adjust FINE control while tapping GA SENS REV key until galvanometer indicates no deflection.

h. Release K3 potentiometer GA SENS key and set EMF-STD-REV EMF-STD switch to EMF.

NOTE

Do not disturb K3 potentiometer COARSE and FINE controls until next standardizing.

i. Set calibration standard RANGE SELECTOR (11, figure 1-2) to MV.

j. Set calibration standard OUTPUT switch (10) to OFF.

k. Rotate K3 potentiometer RANGE switch to extreme clockwise position.

l. Adjust K3 potentiometer A, B, and C controls until VOLT window indicates 0.05000.

m. Set GAIN control on amplifier and null detector to zero, and 1M-10M to 1M.

n. Adjust ZERO SET control until meter indicates 12.

o. Connect calibration standard to test equipment per figure 7-3.

p. Set type 2 instrument calibration standard ON switch to ON, and adjust its MONITOR control until MONITORS AC VOLTMETER indicates null.

q. Set voltage transfer standard SELECTOR switch to No. 2 TC-DC CAL, and adjust No. 2 COARSE ADJ and FINE ADJ controls until galvanometer indicates exactly 0.

r. Set voltage transfer standard GALV - (negative) SENS switch to LO and depress voltage transfer standard TEST KEY.

s. Adjust voltage transfer standard No. 1 COARSE ADJ control until galvanometer indicates 0.

t. Set voltage transfer standard GALV - SENS switch to HI and adjust No. 1 FINE ADJ control until galvanometer indicates 0.

u. Set voltage transfer standard C SELECTOR switch to No. 1 TC-AC and depress TEST KEY.

v. Adjust type 2 instrument calibration standard SET MONITOR control until voltage transfer standard galvanometer indicates 0.

w. Adjust amplifier and null detector ZERO SET control until meter indicates 12.

x. Depress amplifier and null detector INPUT 0.03V switch and NULL-DET. switch.

y. Set amplifier and null detector GAIN control to 10.

z. Set calibration standard OUTPUT switch (10) to AC.

aa. Set calibration standard AC MILLIVOLT SELECTOR switch (29) to position in RANGE column of table 7-8.

bb. Adjust calibration standard VOLTAGE CONTROLS COARSE (26) and FINE (28) until AC standard meter (4) indicates values in METER column of table 7-8.

cc. Adjust standard ratio transformer ratio switches until amplifier and null detector indicates 12. Standard ratio transformer switch must indicate within values listed in LIMITS column of table 7-8.

Table 7-8. AC Millivolt Calibration Data, Low Range

RANGE	METER READING	LIMITS
1.5	150 (on 0 to 150 scale)	0.0149625 to 0.0150375
3.0	30 (on 0 to 30 scale)	0.0299250 to 0.0300750
7.5	75 (on 0 to 75 scale)	0.0748125 to 0.075185
15.0	150 (on 0 to 150 scale)	0.1496250 to 0.1503750
30.0	30 (on 0 to 30 scale)	0.2992500 to 0.3007500
75.0	75 (on 0 to 75 scale)	0.7481250 to 0.7518750

Table 7-9. AC Millivolt Calibration Data, High Range

RANGE	METER READING	LIMITS
150	150 (on 0 to 150 scale)	0.1496250 to 0.1503750
750	75 (on 0 to 75 scale)	0.7481250 to 0.7518750

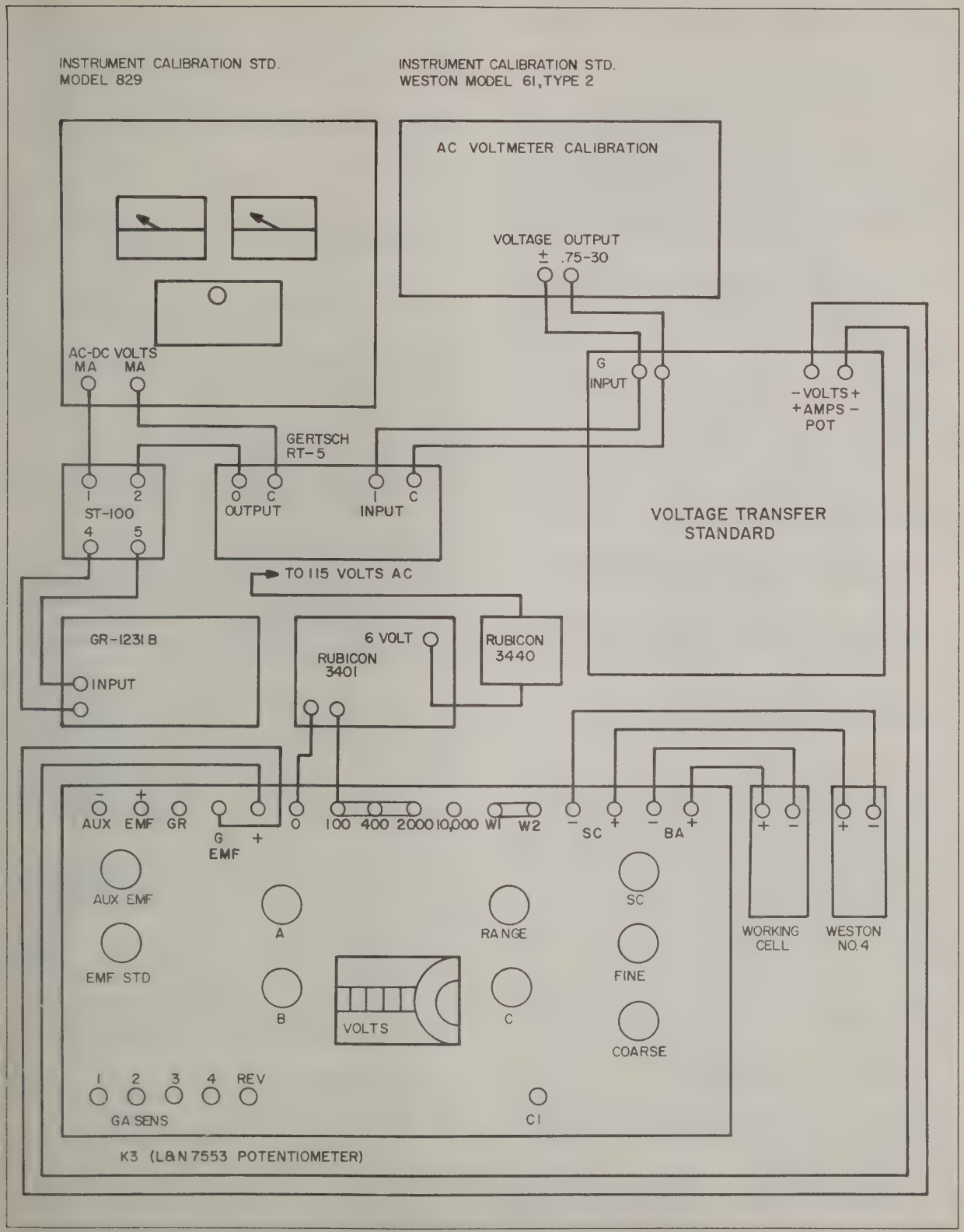

Figure 7-3. AC Millivolt Test Equipment Diagram

dd. Set voltage transfer standard RANGE switch to 1.0.

ee. Adjust K3 potentiometer A, B, and C control until VOLT window indicates 0.0500000.

ff. Set type 2 instrument calibration standard, DIVIDE FULL SCALE VOLTS control to 0-100-0. Set 0-150+1/2 (toggle switch) to 0 and 0-300 +1/2 (toggle switch) to 0. Set OUTPUT RANGE (left-hand) to .75-30 output range (right-hand) to 1.5. SET MONITOR to counterclockwise position and ON (switch) to ON.

gg. Repeat steps 1 through u of paragraph 7-21.

hh. Set calibration standard AC MILLIVOLT SELECTOR switch (29) to positions in RANGE column of table 7-9.

ii. Adjust calibration standard VOLTAGE CONTROLS COARSE (26) and FINE (28) until AC standard meter (4) indicates values in METER column of table 7-9.

jj. Adjust standard ratio transformer ratio switches until amplifier and null detector indicates 12. Standard ratio transformer ratio switch must indicate values in LIMITS column of table 7-9.

kk. Set calibration standard OUTPUT switch (10) to OFF and disconnect from test equipment.

ll. Disconnect voltage transfer standard from type 2 from instrument calibration standard and standard Ratio Transformer.

7-23. AC MILLIAMPERE CALIBRATION.

7-24. Proceed as follows:

a. Set type 2 instrument calibration standard DIVIDE FULL SCALE VOLTS, control to 0-100-0. Set 0-150 +1/2 (toggle switch) to 0 and 0-300 +1/2 (toggle switch) to 0. Set OUTPUT RANGE (left-hand) to .75-30 and OUTPUT RANGE (right-hand) to 15. Set SET MONITOR to counterclockwise position and set ON switch to OFF (down).

b. Set standard ratio transformer ratio switches to .100000.

c. Set voltage transfer standard controls RANGE to 15, SELECTOR to No. 1 TC-AC and BATTERY to ON.

d. Set K3 potentiometer EMF-STD-REV EMF-STD switch to either of STD positions.

e. Adjust K3 potentiometer COARSE switch while tapping GA SENS key 1 until reverse of null current is indicated on galvanometer.

f. Adjust K3 potentiometer FINE control while tapping GA SENS keys 2, 3, and 4 respectively, until galvanometer indicates no deflection when tapping SENS key 4.

g. Lock K3 potentiometer GA SENS key 4 by pressing in and rotating slightly clockwise. Adjust FINE control while tapping GA SENS REV key, until galvanometer indicates no deflection.

h. Release K3 potentiometer GA SENS key and set EMF-STD-REV EMF-STD switch to EMF.

NOTE

Do not disturb K3 potentiometer COARSE and FINE controls until next standardizing.

i. Adjust K3 potentiometer A, B, and C RANGE controls until VOLT window indicates 0.500000.

j. Set calibration standard controls RANGE SELECTOR (11, figure 1-2) to MA OUTPUT switch (10) to OFF.

k. Set amplifier and null detector GAIN controls to zero and 1M-10M to 1M.

l. Adjust amplifier and null detector ZERO SET control until meter reads 12.

m. Connect test equipment per figure 7-3.

n. Connect calibration standard AC-DC VOLTS - (negative) terminal (25) to decade voltage divider INPUT black terminal. Connect calibration standard AC-DC VOLTS + (positive) terminal (25) to decade voltage divider red terminal.

o. Connect decade voltage divider OUTPUT black terminal to standard ratio transformer OUTPUT, C terminal. Connect decade voltage divider red terminal to bridge transformer number 1 terminal.

p. Set type 2 instrument calibration standard ON switch to ON and adjust SET MONITOR control until MONITORS AC VOLTMETER indicates null.

q. Set voltage transfer standard SELECTOR switch to No. 2 TC-DC CAL and adjust No. 2 COARSE ADJ. and FINE ADJ. controls until galvanometer indicates exactly 0.

r. Set voltage transfer standard GALV - SENS switch to LO and depress TEST KEY.

s. Adjust voltage transfer standard No. 1 COARSE ADJ control until galvanometer indicates 0.

t. Set voltage transfer standard GALV - SENS switch to HI and adjust its No. 1 FINE ADJ control until galvanometer indicates 0.

u. Set voltage transfer standard C SELECTOR switch to No. 1 TC-AC and depress TEST KEY.

v. Adjust type 2 instrument calibration standard SET MONITOR control until voltage transfer standard galvanometer indicates 0.

w. Adjust amplifier and null detector ZERO SET control until meter indicates 12.

x. Depress amplifier and null detector INPUT 0.03V switch and NULL DET switch.

y. Set amplifier and null detector GAIN control to 10.

z. Set calibration standard OUTPUT switch (10) to AC.

aa. Set calibration standard AC-DC VOLTS SELECTOR switch (27) to positions in RANGE column of table 7-10.

bb. Set decade voltage divider switches to positions in RATIO column of table 7-10.

cc. Adjust calibration standard COARSE and FINE VOLTAGE CONTROLS (26 and 28) until AC standard meter (4) indicates values in METER column of table 7-10.

dd. Adjust standard ratio transformer ratio switches until decade voltage divider meter indicates 12. Standard ratio transformer ratio switches must indicate values in LIMITS column of table 7-10.

ee. Set calibration standard POWER switch (2) to OFF and instrument calibration standard SET MONITOR controls to counterclockwise position.

ff. Disconnect instrument calibration standard and standard ratio transformer from voltage transfer standard.

7-25. AC AMPERE CALIBRATION.

7-26. Proceed as follows:

a. Connect calibration standard AC-DC AMPS - (negative) terminal (14, figure 1-2) to voltage transfer standard INPUT G terminal.

b. Connect calibration standard AC-DC AMPS + (positive) terminal (15) to voltage transfer standard INPUT red terminal.

c. Set voltage transfer standard RANGE to .05 AMPERES, SELECTOR to No. 1 TC-AC, and BATTERY to ON.

d. Rotate K3 potentiometer A, B, C, and RANGE switches until K3 potentiometer VOLT window indicates 1.5999.

e. Set calibration standard RANGE SELECTOR (11) to AMPS.

f. Set calibration standard OUTPUT switch (10) to AC.

g. Set voltage transfer standard RANGE switch to position in STD column of table 7-11.

h. Set voltage transfer standard SELECTOR switch to No. 1 TC-AC.

i. Set calibration standard AC-DC AMPS SELECTOR switch (12) to positions in RANGE column of table 7-11.

j. Adjust calibration standard CURRENT CONTROLS COARSE (16) and FINE (8) until AC standard meter (4) indicates values in METER column of table 7-11.

k. Set voltage transfer standard GALV - SENS switch to LO and adjust No. 1 COARSE control until galvanometer indicates 0.

l. Set voltage transfer standard GALV - SENS switch to HI and adjust No. 1 FINE ADJ control until galvanometer indicates 0.

m. Set voltage transfer standard SELECTOR switch to No. 2 TC-DC CAL and GALV - SENS switch to LO.

n. Adjust voltage transfer standard No. 2 COARSE ADJ. control until galvanometer indicates 0.

o. Set voltage transfer standard GALV - SENS switch to HI and adjust No. 2 FINE ADJUST control until galvanometer indicates 0.

p. Adjust K3 potentiometer A switch counterclockwise while tapping GA SENS key 1 until galvanometer deflection reverses; then rotate K3 potentiometer A switch one step clockwise.

q. Repeat step p using K3 potentiometer B switch.

r. Adjust K3 potentiometer C control counterclockwise while tapping GA SENS keys 1, 2, 3, and 4 respectively, until galvanometer indicates no deflection.

s. If null indication reversal has not occurred, set K3 potentiometer EMF-STD-REV EMF-STD switch to REV EMF and repeat steps p, q, and r. K3 potentiometer VOLT window should indicate within values listed in LIMITS column of table 7-1.

t. Repeat steps i, l, m, n, o, p, and q of paragraph 7-20 each time steps g, h, i, and j of paragraph 7-26

Table 7-10. AC Milliampere Calibration Data

RANGE	RATIO	METER READING	LIMITS
15	.6667	150 (on 0 to 150 scale)	.6650000 to .6683000
30	.3333	30 (on 0 to 30 scale)	.3325000 to .3341667
75	.1333	75 (on 0 to 75 scale)	.1330000 to .1336667
150	.0667	150 (on 0 to 150 scale)	.0665000 to .0668300
300	.0500	20 (on 0 to 30 scale)	.0498750 to .0501250

Table 7-11. AC Ampere Calibration Data

STD	RANGE	METER READING	LIMITS
.05	.05	5 (on 0 to 5 scale)	.249375 to .250625
.1	.1	10 (on 0 to 10 scale)	.498750 to .501250
.25	.2	2.0 (on 0 to 2.0 scale)	.399000 to .401000
.5	.5	5 (on 0 to 5 scale)	.498750 to .501250
1.0	1	10 (on 0 to 10 scale)	.498750 to .501250
2.5	2	2.0 (on 0 to 2.0 scale)	.399000 to .401000
10	5	5 (on 0 to 5 scale)	.498750 to .501250
10	10	10 (on 0 to 10 scale)	.498750 to .501250
25	20	2.0 (on 0 to 2.0 scale)	.399000 to .401000

are performed. K3 potentiometer VOLT window must indicate values in LIMITS column of table 7-11.

u. Set calibration standard OUTPUT switch (10) to OFF.

v. Disconnect calibration standard from test equipment.

7-27. RESISTANCE CALIBRATION.

7-28. Proceed as follows:

a. Set calibration standard RANGE SELECTOR (11, figure 1-2) to BRIDGE, OUTPUT switch (10) to DC, EXT BAT (19) to OUT, and RATIO SELECTOR (21) to 1.

b. Connect calibration standard X1 and X2 terminals (22) to decade resistor terminals.

c. Set calibration standard 1000 Ω selector (24), 100 Ω selector (23), 10 Ω selector (18), and 1 Ω selector (17) to positions in RANGE column of table 7-12.

d. Depress calibration standard PUSH TO READ switch (6) for each check in table 7-12.

e. Adjust decade resistor ratio switches until calibration standard null meter (5) indicates 0. Decade resistor ratio switches must indicate values in LIMITS column of table 7-12.

f. Set decade resistor (General Radio 1432N) ratio switches to positions in RATIO column of table 7-13.

g. Set calibration standard ratio switch (21) to position in TEST column of table 7-13.

h. Depress calibration standard PUSH TO READ switch (6) for each check in table 7-13.

i. Adjust calibration standard 1000 Ω selector (24), 100 Ω selector (23), 10 Ω selector (18), and 1 Ω selector (17) untill null indicator (5) reads 0. Its 1000 Ω selector (24), 100 Ω selector (23), 10 Ω selector (18), and 1 Ω selector (17) must indicate values of LIMITS column of table 7-13.

j. Disconnect calibration standard X1 and X2 terminals (22) from decade resistor (General Radio 1432N) terminals and connect X1 and X2 terminals (22) to decade resistor (General Radio 1432P terminals.

k. Connect calibration standard AC-DC VOLTS - (negative) terminal (25) to EXT BAT - (negative) terminal (19) and connect AC-DC VOLTS + (positive) terminal (25) to EXT BAT + (positive) terminal (19).

l. Set calibration standard control RANGE SELECTOR (11) to BRIDGE, OUTPUT switch (10) to DC, EXT. BAT. (3) to IN, and AC-DC VOLTS SELECTOR (27) to 20.

m. Adjust calibration standard VOLTAGE CONTROLS COARSE (26) and FINE (28) until DC standard meter (7) indicates 20 (on 0 to 20 scale).

n. Set decade resistor (General Radio 1432P) ratio switches to positions in RATIO column of table 7-14.

o. Set calibration standard RATIO switch (21) to position in TEST column of table 7-14.

p. Depress calibration standard PUSH TO READ switch (6) for each check in table 7-14.

Table 7-12. Selector Calibration Data

RANGE	LIMITS
11111	11083.2 to 11138.8
10000	9975.0 to 10025.0
9999	9975.0 to 10025.0
8888	8865.8 to 8910.2
7777	7757.6 to 7796.4
6666	6549.3 to 6682.7
5555	5541.1 to 5568.9
4444	4432.9 to 4455.1
3333	3324.7 to 3341.3
2222	2216.4 to 2227.6
1111	1108.2 to 1113.8

Table 7-13. Resistance Ratio Chart A

RATIO	TEST	LIMITS
800 ohms	.1	7980 to 8020
80 ohms	.01	7980 to 8020
8 ohms	.001	7960 to 8040

Table 7-14. Resistance Ratio Chart B

RATIO	TEST	LIMITS
80 K ohms	10	7980 to 8020
800 K ohms	100	7980 to 8020
1 meg. ohm	1000	0995 to 1005

Table 7-15. Calibration Performance Data

FUNCTION	RANGE	LIMITS
DC VOLTAGE CALIBRATION		
	.2	0.19950 to 0.20050
	.5	0.49875 to 0.50125
	1.0	0.99750 to 1.00250
	2.0	1.99500 to 2.00500
	5.0	4.98750 to 5.01250
	10.0	9.97500 to 10.0250
	20.0	19.9500 to 20.0500
	50.0	49.8750 to 50.1250
	100.0	99.7500 to 100.250
	200.0	199.500 to 200.500
	500.0	498.750 to 501.250
	1000.0	997.500 to 1002.50
	2000.0	1995.00 to 2005.00
DC MILLIVOLT CALIBRATION		
	0.25	0.249375 to 0.250625
	0.5	0.498750 to 0.501250
	1.0	0.997500 to 1.002500
	2.5	2.493750 to 2.506250
	5.0	4.987500 to 5.012500
	10.0	9.975000 to 10.02500
	25.0	24.93750 to 25.06250
	50.0	49.87500 to 50.12500
	100.0	99.75000 to 100.2500
DC MILLIAMPERE CALIBRATION		
	1.0	0.99750 to 1.00250
	2.0	1.99500 to 2.00500
	5.0	4.98750 to 5.01250
	10.0	9.97500 to 10.0250
	20.0	19.9500 to 20.0500
DC AMPERE CALIBRATION		
	0.05	0.0498750 to 0.0501250
	0.1	0.0997500 to 0.1002500
	0.2	0.1995000 to 0.2005000
	0.5	0.4987500 to 0.5012500
	1.0	0.9975000 to 1.0025000
	2.0	1.9950000 to 2.0050000
	5.0	4.9875000 to 5.0125000
	10.0	9.9750000 to 10.025000
	20.0	19.950000 to 20.050000
AC VOLTAGE CALIBRATION		
	1.5	1.496250 to 1.503750
	3.0	2.992500 to 3.007500
	7.5	7.481250 to 7.518750
	15.0	14.96250 to 15.03750
	30.0	29.92500 to 30.07500
	75.0	74.81250 to 75.18750
	150.0	149.6250 to 150.3750
	300.0	299.2500 to 300.7500
	750.0	748.1250 to 751.8750
	1500.0	1496.250 to 1503.750

Table 7-15. Calibration Performance Data (Cont)

FUNCTION	RANGE	LIMITS
AC MILLIVOLT CALIBRATION		
	1.5	1.496250 to 1.503750
	3.0	2.992500 to 3.007500
	7.5	7.481250 to 7.518750
	15.0	14.96250 to 15.03750
	30.0	29.92500 to 30.07500
	75.0	74.81250 to 75.18750
	150.0	149.6250 to 150.3750
	300.0	299.2500 to 300.7500
	750.0	748.1250 to 751.8750
AC MILLIAMPERE CALIBRATION		
	1.5	1.496250 to 1.503750
	3.0	2.992500 to 3.007500
	7.5	7.481250 to 7.518750
	15.0	14.96250 to 15.03750
	30.0	29.92500 to 30.07500
AC AMPERE CALIBRATION		
	0.05	0.0498750 to 0.0501250
	0.1	0.0997500 to 0.1002500
	0.2	0.1995000 to 0.2005000
	0.5	0.4987500 to 0.5012500
	1.0	0.9975000 to 1.0025000
	2.0	1.9950000 to 2.0050000
	5.0	4.9875000 to 5.0125000
	10.0	9.9750000 to 10.025000
	20.0	19.950000 to 20.050000
RESISTANCE CALIBRATION		
	11,111	11,083.2 to 11,138.8
	10,000	9,975.0 to 10,025.0
	9,999	9,975.0 to 10,025.0
	8,888	8,865.8 to 8,910.2
	7,777	7,757.6 to 7,796.4
	6,666	6,549.3 to 6,682.7
	5,555	5,541.1 to 5,568.9
	4,444	4,432.9 to 4,455.1
	3,333	3,324.7 to 3,341.3
	2,222	2,216.4 to 2,227.6
	1,111	1,108.2 to 1,113.8
	800 ohms	7980 to 8020
	80 ohms	7980 to 8020
	8 ohms	7960 to 8040
	80 K ohms	7980 to 8020
	800 K ohms	7980 to 8020
	1 M	0995 to 10050

q. Adjust calibration standard 1000 Ω selector (24), 100 Ω selector (23) 10 Ω selector (18), and 1 Ω selector (17) until null indicator (5) indicates 0. Its 1000 Ω selector (24), 100 Ω selector (23), 10 Ω selector (18), and 1 Ω selector (17) must indicate values in LIMITS column of table 7-14.

r. Set calibration standard OUTPUT switch (10) to OFF, VOLTAGE CONTROLS COARSE (26) and FINE (28) to counterclockwise position.

s. Disconnect calibration standard X1 and X2 terminals (22) from decade resistor (General Radio 1432P) terminals.

t. Disconnect calibration standard AC-DC VOLTS terminal (25) from EXT BAT terminals (19).

T.O. 33D9-39-21-4

TECHNICAL MANUAL

ILLUSTRATED, PARTS BREAKDOWN

AC-DC INSTRUMENT CALIBRATION STANDARD

MODEL RFL 829

PART NO. 7901809

PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

AFPS SA SEP 67, 200

15 OCTOBER 1960

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TABLE OF CONTENTS

Section		Page
I	INTRODUCTION	1-1
	Figure 1. AC-DC Calibration Standard	1-4
II	GROUP ASSEMBLY PARTS LIST	2-1
	Figure 2. AC-DC Calibration Standard	2-1
	Figure 3. Calibration Standard Panel and Chassis Assembly	2-3
	Figure 4. Electrical Equipment Chassis Assembly	2-5
	Figure 5. Electrical Equipment Chassis Assembly	2-8
	Figure 6. Electrical Test Panel	2-11
	Figure 7. AC Switch Assembly	2-13
	Figure 8. AC-DC Switch Assembly	2-14
	Figure 9. Electrical Equipment Chassis Assembly	2-16
	Figure 10. Electrical Test Panel	2-19
	Figure 11. Relay Panel Assembly	2-21
	Figure 12. Power Input Panel Assembly	2-23
III	NUMERICAL INDEX	3-1
IV	REFERENCE DESIGNATION INDEX	4-1

SECTION I

INTRODUCTION

1-1. GENERAL.

1-2. DESCRIPTION. This Illustrated Parts Breakdown lists and identifies by Part Number, Description, and Appearance items of the following equipment manufactured by AC Spark Plug, Division of General Motors Corporation, Milwaukee, Wis. (See figure 1.)

Part Number Type Number Description

1-3. CONTENTS. This Illustrated Parts Breakdown is divided into four sections: The Introduction (Section I), the Group Assembly Parts List (Section II), the Numerical Index (Section III), and the Reference Designation Index (Section IV).

1-4. GROUP ASSEMBLY PARTS LIST.

1-5. EXPLANATION. The Group Assembly Parts List contains assemblies, subassemblies and detail parts in order of disassembly. Each is identified by index numbers in the Illustration.

1-6. FIGURE AND INDEX COLUMN. This column gives the figure number of the illustration in which the parts are shown and the index number by which they may be identified.

1-7. PART NUMBER COLUMN. This column lists each part by its AC Spark Plug part number, except government standard parts, vendor supplied parts, and commercial hardware. In these exceptions, AC Spark Plug control numbers are given parenthetically as the last item in the "Description" column and apply to all part numbers appearing in the "Part No." column. Commercial hardware parts available from normal commercial sources and having no definite part number are listed in the "Part No." column as "COML". All approved sources for vendor supplied parts are listed in the "Part No." column and are equal in application.

1-8. DESCRIPTION COLUMN. This column gives the approved item name obtained from Cataloging Handbook H6-1, plus those modifiers required to identify the item. Subassembly and detail parts of an assembly follow the listing of the assembly and are indented to the next column. Attaching parts are preceded by "ATTACHING PARTS" and followed by the symbol "-----*-----". For vendor supplied parts and government standard parts, used in the "Part No." column, a vendor code number (see sub-paragraph 1-24) is parenthetically inserted in the "Description" column following the description of the part in accordance with the Federal Supply Code for Manufacturer's Cataloging Handbook H4-1. "Abbreviations": The use of abbreviations used throughout this Illustrated Parts Breakdown are in accordance with Military Standard MIL-STD-12.

1-9. UNITS PER ASSEMBLY COLUMN. This column indicates, for the item, the quantity required in the assembly of which it is a part. The quantities specified are not necessarily the total used per article. Refer to the Numerical Index (Section III) for the total quantities used. The symbol "REF" is used for an assembly which has already been listed and the quantity shown as part of the next higher assembly.

1-10. USABLE ON CODE COLUMN. This column is left blank since no variation in usage exists.

1-11. NUMERICAL INDEX.

1-12. EXPLANATION. The Numerical Index (Section III) is a complete alpha-numerical tabulation of all part numbers contained in the Group Assembly Parts List (Section II), giving stock numbers, source codes, and figure and index numbers assigned to them, and the total quantity per aticle.

1-13. PART NUMBER COLUMN. This column lists all part numbers, AC Spark Plug control numbers, the identifying noun for commercial hardware and which are parts to which no part number has been assigned contained in the Group Assembly Parts List (Section II). The numbers are arranged in alpha-numerical order, beginning with the extreme left hand position and continuing from left to right, one position at a time. In the first position, letters A through Z come first, followed by numerals 0 through 9. Order of precedence for succeeding positions are as follows: Space ( ), diagonal (/), point (.), dash (-), letters A through Z, numerals 0 through 9. Alphabetic O's shall be considered as numerical zeros. AC Spark Plug control numbers listed in the "Part No." column are cross-referenced to their corresponding government standard or vendor supplied part number. AC Spark Plug control numbers for commercial hardware, listed in the "Part No." column are cross-referenced to their first item name appearing in the "Description" column of the Group Assembly Parts List (Section II). These cross-referenced part numbers and item names are given in parentheses and begin in the "Figure and Index Number" column and occupy as many columns to the right as required.

1-14. STOCK NUMBER COLUMN. This column lists the approved service class codes and serial or part number (combined, they form the complete Stock Number) for use in procuring replacements for individual components. When the complete Stock Number of an item does not appear, reference should be made to S-00-1-1 USAF Master Cross-Reference Index.

1-15. FIGURE AND INDEX COLUMN. This column gives the figure number of the illustration in which

the parts are shown and the index number by which they may be identified. The figure and index numbers for AC Spark Plug control numbers are listed in this column beneath the cross-referenced part number or name. When an assembly, subassembly, or detail part has not been assigned an index number, only the figure number will appear in this column.

1-16. QUANTITY PER ARTICLE COLUMN. This column lists the total quantity required per article.

1-17. THE SOURCE CODE. This column in the Numerical Index (Section III) has been left blank because no provisioning review has been completed to date.

1-18. REFERENCE DESIGNATION INDEX.

1-19. EXPLANATION. The Reference Designation Index (Section IV) lists in alpha-numerical order, the reference designations assigned to detail parts on diagrams and illustrations used in related publications.

1-20. REFERENCE DESIGNATION. They are arranged in alpha-numerical order and cross-referenced to the figure and index number, stock number and part number of the part covered. This provides a means of identifying, locating and procuring those parts for which only a visual referenced designation is known.

1-21. HOW TO USE THE ILLUSTRATED PARTS BREAKDOWN.

1-22. TO FIND PART NUMBER IF APPEARANCE OR PART IS KNOWN:

a. Refer to Table of Contents for reference to the illustration of the unit.

b. Turn to the illustration of the unit.

c. Locate the part and its index number on the illustration.

d. Find the index number in the Group Assembly Parts List to determine the complete description.

1-23. TO FIND THE ILLUSTRATION FOR A PART IF THE PART NUMBER IS KNOWN:

a. Refer to Section III, the Numerical Index, and find the part number.

b. Turn to Section II. The figure and index number given in the Numerical Index refers to both the Group Assembly Parts List, which gives the complete description, and the illustration which calls out the part. If the illustration calls out the part in a location or component other than the one desired, refer to the other figure and index numbers listed in the Numerical Index.

1-24. VENDOR'S CODE.

1-25. VENDOR CODE NUMBERS USED IN THE ILLUSTRATED PARTS BREAKDOWN ARE AS FOLLOWS:

CODE	NAME AND ADDRESS
02660	Amphenol-Borg Electronics Corp. Broadview (Chicago), Ill.
14655	Cornell Dubilier Electric Corporation South Plainfield, New Jersey
15909	Daven Company Livingston, New Jersey
21964	Federal Telephone and Radio Corp. Clifton, N. J.
24455	General Electric Co., Lamp Division of Consumer Products Group Nela Park, Cleveland, Ohio
24655	General Radio Company Cambridge, Massachusetts
28520	Heyman Mfg. Co. Kenilworth, N. J.
37942	Mallory, P. R., and Company, Inc. Indianapolis, Indiana
40228	Micro Switch Division Minneapolis-Honeywell Regulator Co. Freeport, Illinois
44655	Ohmite Manufacturing Company Skokie, Ill.
49671	Radio Corporation of America New York, New York
49673	Radio Frequency Laboratories, Inc. Boonton, New Jersey
54294	Shallcross Manufacturing Company, Inc. Collingdale, Pennsylvania
58474	Superior Electric Company, The Bristol, Connecticut
61864	United-Carr Fastener Corporation Boston, Massachusetts
63743	Ward Leonard Electric Co. Mount Vernon, New York
65092	Weston Instruments Division of Daystrom, Inc. Newark, New Jersey
70485	Atlantic India Rubber Works, Inc. Chicago, Illinois

CODE	NAME AND ADDRESS
70563	Amperite Co. New York, N. Y.
71400	Bussmann Fuse Division of McGraw-Edison Co. St. Louis, Missouri
72619	Dialight Corp. Brooklyn, N. Y.
72825	Eby, Hugh H., Inc. Philadelphia, Pennsylvania
74545	Hubbell, Harvey, Inc. Bridgeport, Connecticut
74861	Industrial Condenser Corp. Chicago, Illinois
74970	Johnson E. F., Company Waseca, Minnesota
75042	International Resistance Co. Philadelphia, Pennsylvania
75173	Jones, Howard B., Division of Cinch Manufacturing Corporation Chicago, Illinois
75915	Littelfuse, Inc. Des Plaines, Ill.
77342	Potter and Brumfield, Inc. Princeton, Ind.
78553	Tinnerman Products, Inc. Cleveland, Ohio
79566	Whitney Blake Co. New Haven, Conn.
81350	Joint Army-Navy Specifications
82389	Switchcraft, Inc. Chicago, Illinois
88299	Gee Lar Mfg. Co. Rockford, Illinois
91738	Groov Pin Corp. Ridgefield, N. J.

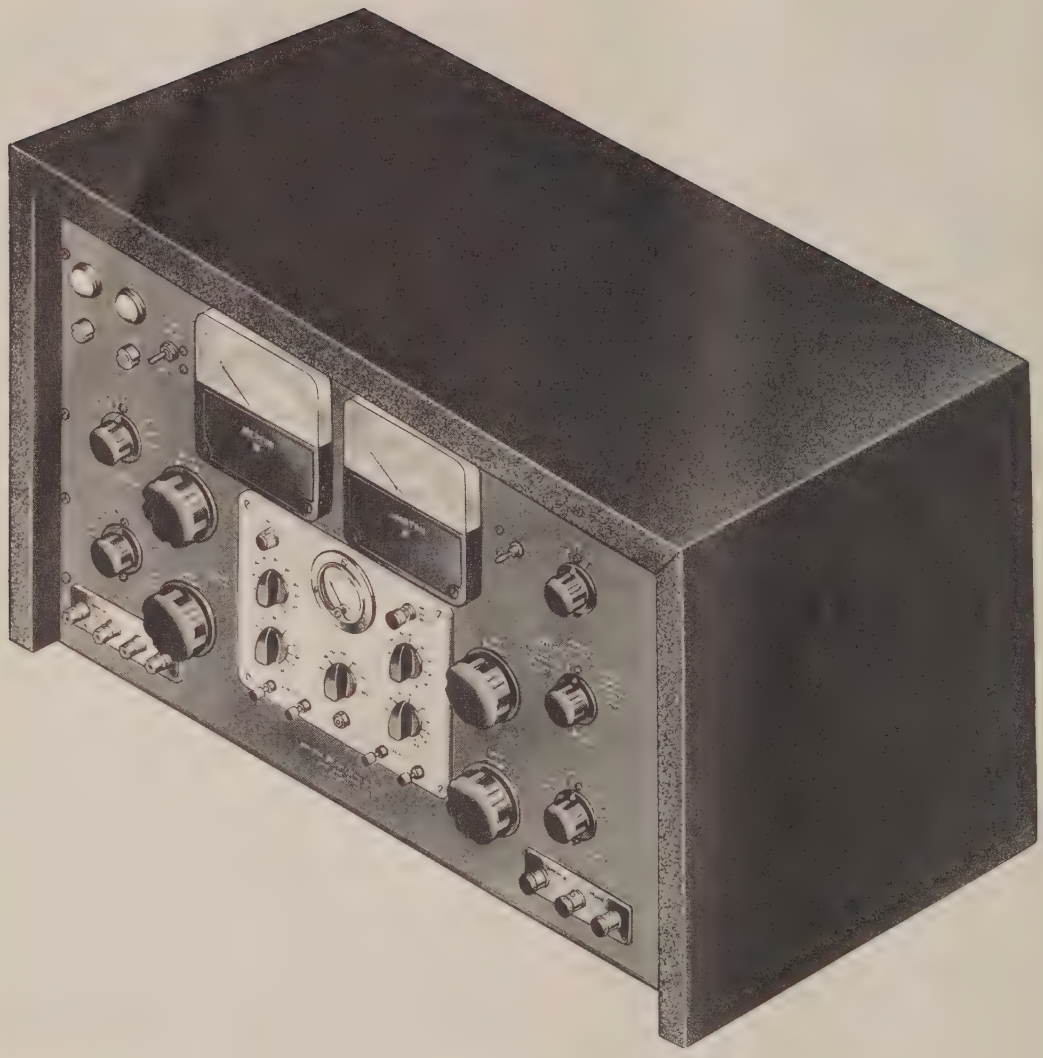


Figure 1. AC-DC Calibration Standard, Model 829

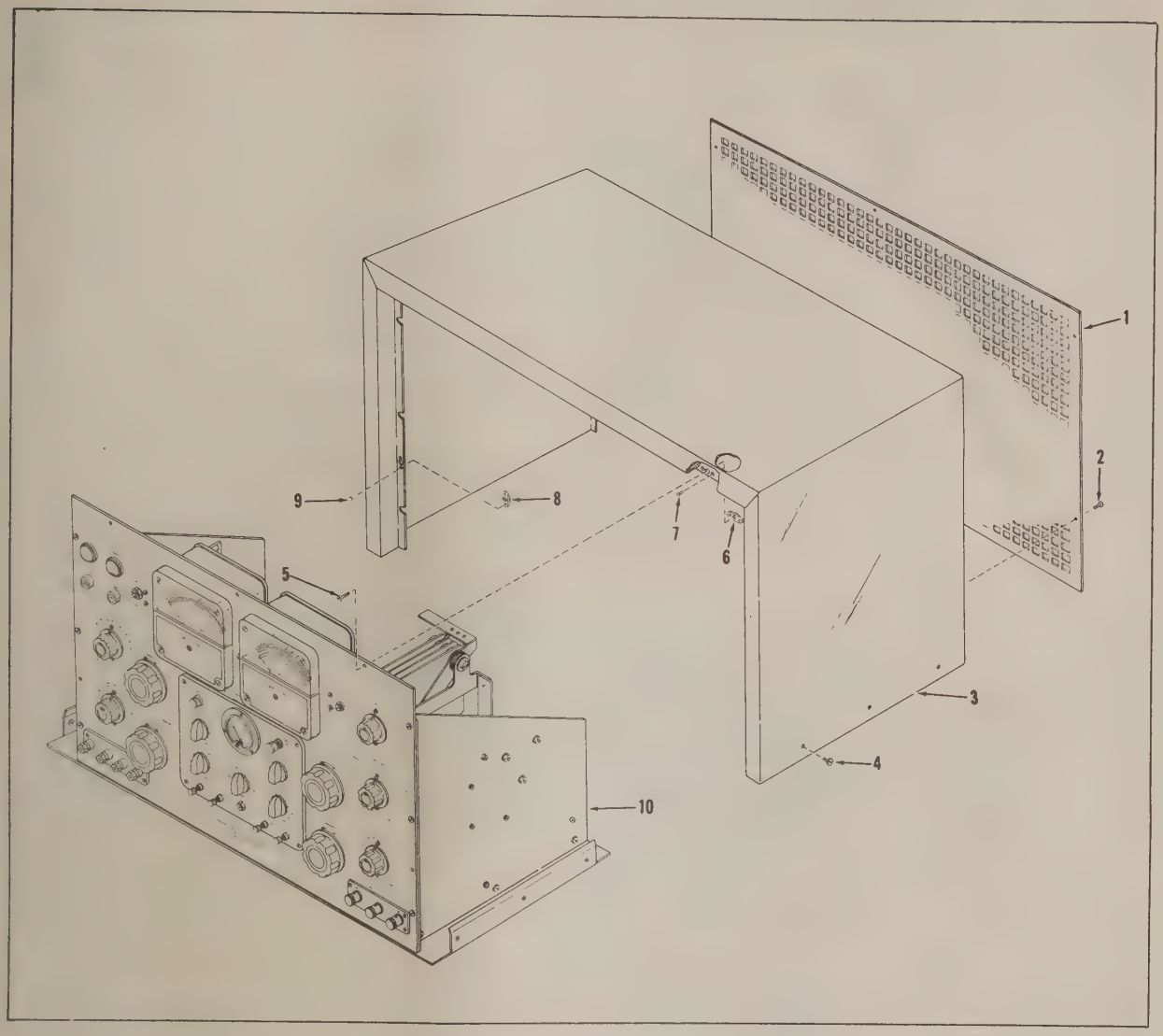
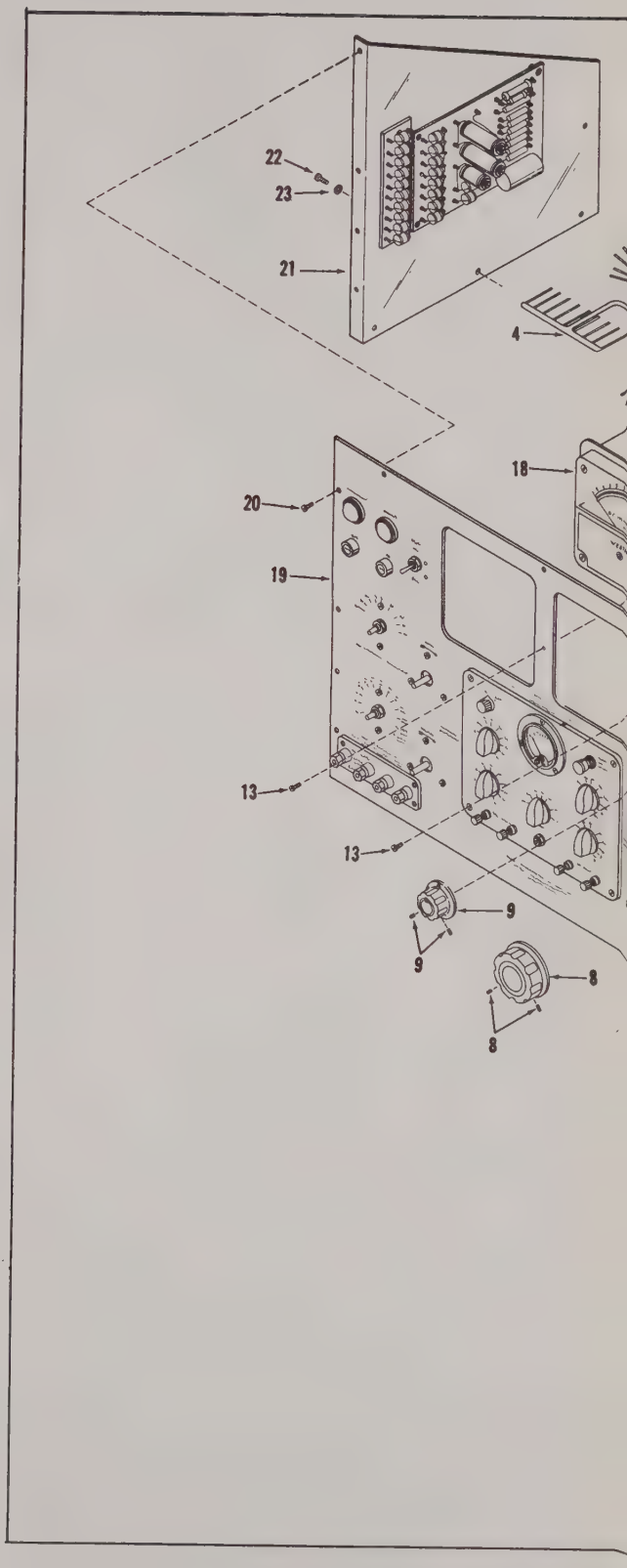


Figure 2. AC-DC Calibration Standard

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		AC-DC CALIBRATION STANDARD		
2-	HD6401	CALIBRATION STANDARD, AC-DC, Model 829 . . . . . (49673) (99974 No. 7901809)	1	
-1	HD6496	. COVER, CALIBRATOR (49673)	1	
		(ATTACHING PARTS)		
-2	COML	. SCREW, MACHINE, Phillips bind. hd, self starting, stl, ni plated, No. 8-32 NC-2A by 1/2 in. lg (49673 No. H1630-27)	12	

---------*---------

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
		AC-DC CALIBRATION STANDARD (CONT)		
2-3	HD6494	. COVER, CALIBRATOR (49673)	1	
		(ATTACHING PARTS)		
-4	COML	. SCREW, MACHINE, Bind. hd, stl, ni plated, No. 10-32 NC-2A by 3/8 in. lg (49673 No. H1260-55)	6	
-5	COML	. SCREW, MACHINE, Bind. hd, sst, No. 10-32 NC-2A by 3/4 in. lg (49673 No. H1490-13)	5	
-6	HA6655	. NUT, PLAIN, PLATE (49673)	3	
-7	COML	. RIVET, SOLID, Rh, 0.128 max, 0.124 min dia by 5/16 in. lg (49673 No. H1170-80)	6	
-8	HA6654	. NUT, PLAIN, PLATE (49673)	2	
-9	COML	. RIVET, SOLID, Csk hd, 0.098 max, 0.093 min dia by 1/4 in. lg (49673 No. H1170-64)	4	
		--------*--------		
-10	HD6402	. PANEL AND CHASSIS ASSEMBLY, CALIBRATION STANDARD (See figure 3 for breakdown) (49673)	1	
		CALIBRATION STANDARD PANEL AND CHASSIS ASSEMBLY		
3-	HD6402	PANEL AND CHASSIS ASSEMBLY, CALIBRATION STANDARD (See 10, figure 2 for next higher assembly) (49673)	REF	
-1	HC6617	. WIRING HARNESS, BRANCHED, #1 (49673)	1	
-2	HC6618	. WIRING HARNESS, BRANCHED, #2 (49673)	1	
-3	HC6615	. WIRING HARNESS, BRANCHED, #3 (49673)	1	
-4	HC6616	. WIRING HARNESS, BRANCHED, #4 (49673)	1	
-5	HE6614	. WIRING HARNESS, BRANCHED, #5 (49673)	1	
-6	HC6619	. WIRING HARNESS, BRANCHED, #6 (49673)	1	
-7	HC10962	. WIRING HARNESS, BRANCHED, Relay (49673)	1	
-8	KNS12	. KNOB, Round (shown in three parts) (24655) (49673 No. HA6436)	4	
-9	KNSP8	. KNOB, Pointer (shown in three parts) (24655) (49673 No. HA6631)	5	
-10	HB6620	. BRACKET, DOUBLE ANGLE (49673)	1	
		(ATTACHING PARTS)		
-11	COML	. SCREW, MACHINE, Rh, brs, ni plated, 1/4-28 NC-2A by 3/4 in. lg (49673 No. H1130-173)	4	
-12	COML	. WASHER, LOCK, Split, stl, cad. plated, for 1/4 in. screw (49673 No. H1160-29)	4	
-13	COML	. SCREW, MACHINE, Bind. hd, stl, ni plated, No. 6-32 NC-2A by 1/2 in. lg (49673 No. H1260-53)	6	
-14	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw (49673 No. H1160-40)	5	
-15	COML	. NUT, PLAIN, HEXAGON, stl, cad. plated, No. 6-32 NC-3B (49673 No. H1150-56)	4	
-16	HA6621	. SPACER, SLEEVE (49673)	1	
		--------*--------		
-17	HC6438	. MULTIMETER, AC (Altered from 65092 No. 924) (49673)	1	
-18	HC6439	. MULTIMETER, DC (Altered from 65092 No. 921) (49673)	1	
-19	HD6403	. PANEL, TEST, ELECTRICAL (See figure 6 for breakdown) (49673)	1	
		(ATTACHING PARTS)		
-20	COML	. SCREW, MACHINE, Bind. hd, sst, No. 10-32 NC-2A by 1/2 in. lg (49673 No. H1490-15)	6	
		--------*--------		
-21	HD6573	. CHASSIS ASSEMBLY, ELECTRICAL EQUIPMENT, Left (See figure 5 for breakdown) (49673)	1	
		(ATTACHING PARTS)		
-22	COML	. SCREW, MACHINE, Bind. hd, stl, ni plated, No. 10-32 NC-2A by 3/8 in. lg (49673 No. H1260-55)	3	
-23	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 10 screw (49673 No. H1160-39)	3	
		--------*--------		


22
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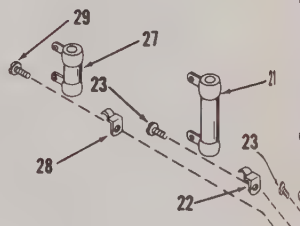
8
8

Figure 3. Calibration Standard Panel and Chassis

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		CALIBRATION STANDARD PANEL AND CHASSIS ASSEMBLY (CONT)		
3-24	HD6575	. CHASSIS ASSEMBLY, ELECTRICAL EQUIPMENT, Right . . . . . (See figure 4 for breakdown) (49673)	1	
		(ATTACHING PARTS)		
-25	COML	. SCREW, MACHINE, Bind. hd, stl, ni plated, No. 10-32 NC-2A . . . by 3/8 in. lg (49673 No. H1260-55)	3	
-26	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 10 screw . . . . . (49673 No. H1160-39)	3	
		--------*--------		
-27	HD6410	. CHASSIS ASSEMBLY, ELECTRICAL EQUIPMENT, Bottom . . . . . (shown in two parts) (See figure 9 for breakdown) (49673)	1	
		ELECTRICAL EQUIPMENT CHASSIS ASSEMBLY		
4-	HD6575	CHASSIS ASSEMBLY, ELECTRICAL EQUIPMENT, Right . . . . . (See 24, figure 3 for next higher assembly) (49673)	REF	
-1	HC6471	. SHUNT, INSTRUMENT, MULTIRANGE (49673)	1	
		(ATTACHING PARTS)		
-2	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 8-32 . . . . . NC-2A by 5/16 in. lg (49673 No. H1260-40)	2	
-3	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw . . . . . (49673 No. H1160-42)	2	
		--------*--------		
-4	HB6604	. TRANSFORMER, CURRENT (49673)	1	
		(ATTACHING PARTS)		
-5	COML	. NUT, PLAIN, HEXAGON, Stl, cad. plated, 1/4-28 NC-3B . . . . . (49673 No. H1150-59)	3	
-6	COML	. WASHER, LOCK, Split, stl, cad. plated, for 1/4 in. screw . . . . . (49673 No. H1160-29)	3	
		--------*--------		
-7	HA6447	. SHUNT, INSTRUMENT (49673)	1	
		(ATTACHING PARTS)		
-8	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 8-32 . . . . . NC-2A by 1-1/4 in. lg (49673 No. H1260-146)	2	
-9	COML	. NUT, PLAIN, HEXAGON, Brs, ni plated, No. 8-32 NC-3B . . . . . (49673 No. H1150-50)	2	
-10	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw . . . . . (49673 No. H1160-42)	2	
-11	COML	. WASHER, FLAT, Brs, ni plated, for No. 8 screw . . . . . (49673 No. H1230-31)	4	
		--------*--------		
4-	HB6608	. COMPONENT BOARD ASSEMBLY (49673)	1	
		(ATTACHING PARTS)		
-12	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 . . . . . NC-2A by 3/8 in. lg (49673 No. H1260-29)	4	
-13	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw . . . . . (49673 No. H1160-40)	4	
		--------*--------		
-14	25A1WL	. . RESISTOR, ADJUSTABLE, 1 Ohm, ±10%, 25W . . . . . (63743) (49673 No. H1100-182)	1	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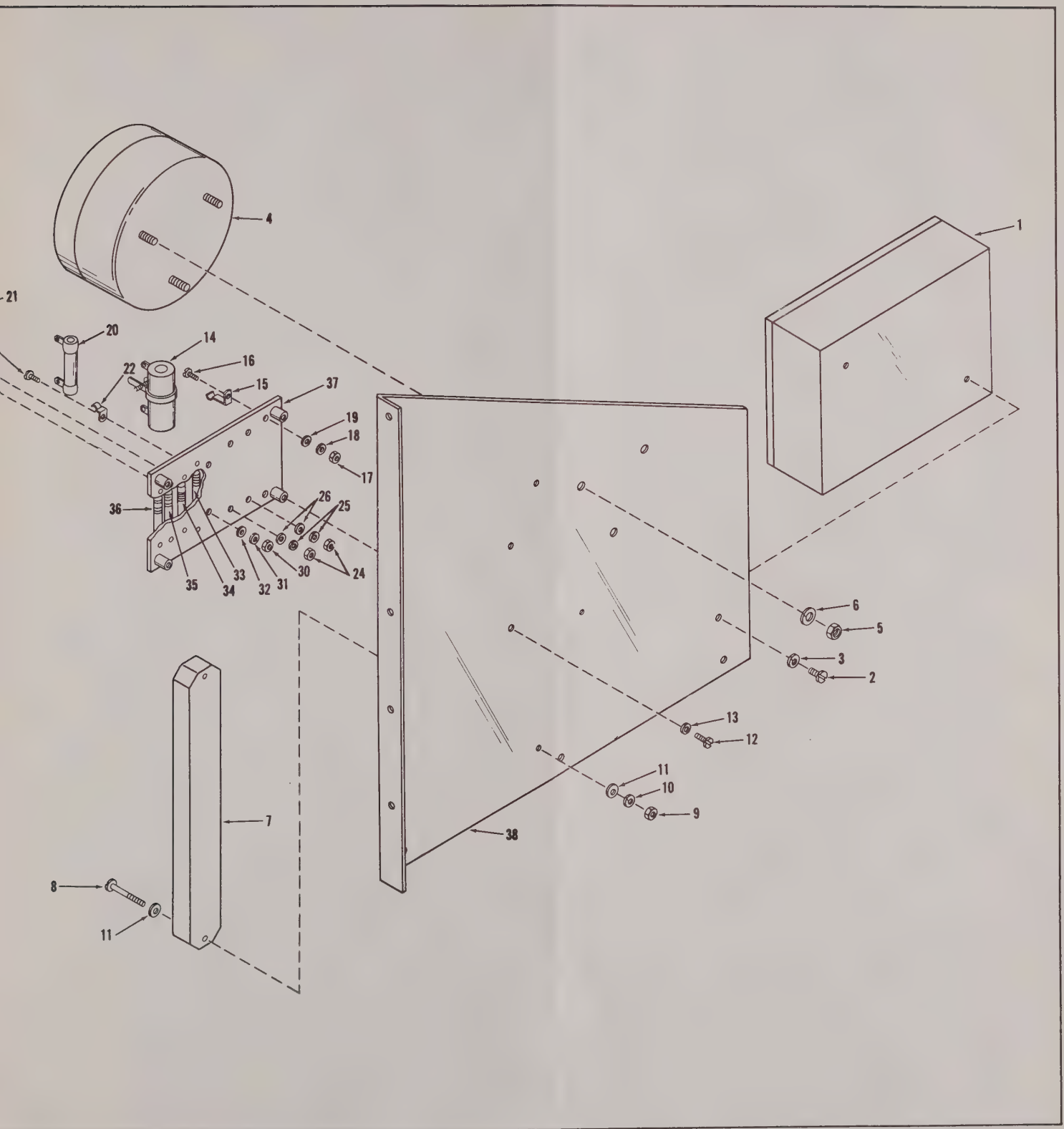

Figure 4. Electrical Equipment Chassis

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		ELECTRICAL EQUIPMENT CHASSIS ASSEMBLY (CONT)		
4-15	HA6432	. . HOLDER, RESISTOR, Pair (49673)	1	
		(ATTACHING PARTS)		
-16	COML	. . SCREW, MACHINE, Rh, brs, ni plated, No. 6-32 NC-2A by 5/16 in. lg (49673 No. H1130-28)	2	
-17	COML	. . NUT, PLAIN, HEXAGON, Brs, ni plated, No. 6-32 NC-3B (49673 No. H1150-6) . . .	2	
-18	COML	. . WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw (49673 No. H1160-40)	2	
-19	COML	. . WASHER, FLAT, Brs, ni plated, for No. 6 screw (49673 No. H1230-34)	2	
		--------*--------		
-20	10F2WL	. . RESISTOR, FIXED, WIRE WOUND, 2 Ohms, ±10%, 10 W (63743) (49673 No. H1100-181)	1	
-21	10F4WL	. . RESISTOR, FIXED, WIRE WOUND, 4 Ohms, ±10%, 10 W (63743) (49673 No. H1100-180)	1	
-22	HA6433	. . HOLDER, RESISTOR, Pair (49673)	2	
		(ATTACHING PARTS)		
-23	COML	. . SCREW, MACHINE, Rh, brs, ni plated, No. 6-32 NC-2A by 5/16 in. lg (49673 No. H1130-28)	4	
-24	COML	. . NUT, PLAIN, HEXAGON, Brs, ni plated, No. 6-32 NC-3B (49673 No. H1150-6)	4	
-25	COML	. . WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw (49673 No. H1160-40)	4	
-26	COML	. . WASHER, FLAT, Brs, ni plated, for No. 6 screw (49673 No. H1230-34)	4	
		--------*--------		
-27	5F10WL	. . RESISTOR, FIXED, 10 Ohms, ±10%, 5 W (63743) (49673 No. H1100-185)	1	
-28	HA6628	. . HOLDER, RESISTOR, Pair (49673)	1	
		(ATTACHING PARTS)		
-29	COML	. . SCREW, MACHINE, Rh, brs, ni plated, No. 6-32 NC-2A by 5/16 in. lg (49673 No. H1130-28)	2	
-30	COML	. . NUT, PLAIN, HEXAGON, Brs, ni plated, No. 6-32 NC-3B (49673 No. H1150-6)	2	
-31	COML	. . WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw (49673 No. H1160-40)	2	
-32	COML	. . WASHER, FLAT, Brs, ni plated, for No. 6 screw (49673 No. H1230-34)	2	
		--------*--------		
-33	BW2-18	. . RESISTOR, FIXED, WIRE WOUND, 18 Ohms, ±10%, 2 W (75042) (49673 No. H1100-184)	1	
-34	BW1-47	. . RESISTOR, FIXED, WIRE WOUND, 47 Ohms, ±10%, 1 W (75042) (49673 No. H1100-183)	1	
-35	BW1-100	. . RESISTOR, FIXED, WIRE WOUND, 100 Ohms, ±10%, 1 W (75042) (49673 No. H1100-186)	1	
-36	25ADJ.	. . RESISTOR, FIXED, COMPOSITION, 100 Ohms, ±5%, 1 W (63743) (4973 No. H1009-182)	1	
-37	HB6609	. . TERMINAL BOARD (Inseparable) (49673)	1	
-38	HC6490	. CHASSIS, ELECTRICAL EQUIPMENT (49673)	1	

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		ELECTRICAL EQUIPMENT CHASSIS ASSEMBLY		
5-	HD6573	CHASSIS ASSEMBLY, ELECTRICAL EQUIPMENT, Left . . . . . (See 21, figure 3 for next higher assembly) (49673)	REF	
5-	HB6572	. COMPONENT BOARD ASSEMBLY (49673)	1	
		(ATTACHING PARTS)		
-1	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 . . . . . NC-2A by 3/8 in. lg (49673 No. H1260-29)	3	
-2	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw . . . . . (49673 No. H1160-40)	3	
		--------*--------		
-3	1120-500	. . RESISTOR, FIXED, WIRE WOUND, 500 Ohms, ±0.1%, 0.33 W . . . (15909) (49673 No. H1060-21)	1	
-4	1120-300	. . RESISTOR, FIXED, WIRE WOUND, 300 Ohms, ±0.1%, 0.33 W . . . (15909) (49673 No. H1060-22)	1	
-5	1120-100	. . RESISTOR, FIXED, WIRE WOUND, 100 Ohms, ±0.1%, 0.33 W . . . (15909) (49673 No. H1060-23)	1	
-6	1120-50	. . RESISTOR, FIXED, WIRE WOUND, 50 Ohms, ±0.1%, 0.33 W . . . (15909) (49673 No. H1060-24)	1	
-7	1120-30	. . RESISTOR, FIXED, WIRE WOUND, 30 Ohms, ±0.1%, 0.33 W . . . (15909) (49673 No. H1060-25)	1	
-8	1120-10	. . RESISTOR, FIXED, WIRE WOUND, 10 Ohms, ±0.1%, 0.33 W . . . (15909) (49673 No. H1060-26)	1	
-9	1120-5	. . RESISTOR, FIXED, WIRE WOUND, 5 Ohms, ±0.1%, 0.33 W . . . (15909) (49673 No. H1060-27)	1	
-10	1120-3	. . RESISTOR, FIXED, WIRE WOUND, 3 Ohms, ±0.1%, 0.33 W . . . (15909) (49673 No. H1060-28)	1	
-11	1120-1	. . RESISTOR, FIXED, WIRE WOUND, 1 Ohms, ±0.1%, 0.33 W . . . (15909) (49673 No. H1060-29)	2	
-12	HB6571	. . TERMINAL BOARD (Inseparable) (49673)	1	
5-	HC6600	. COMPONENT BOARD ASSEMBLY (49673)	1	
		(ATTACHING PARTS)		
-13	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 . . . . . NC-2A by 3/8 in. lg (49673 No. H1260-29)	5	
-14	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw . . . . . (49673 No. H1160-40)	5	
		--------*--------		
-15	1120-100	. . RESISTOR, FIXED, WIRE WOUND, 100 Ohms, ±0.1%, 0.33 W . . . (15909) (49673 No. H1060-23)	1	
-16	1120-300	. . RESISTOR, FIXED, WIRE WOUND, 300 Ohms, ±0.1%, 0.33 W . . . (15909) (49673 No. H1060-22)	1	
-17	1120-500	. . RESISTOR, FIXED, WIRE WOUND, 500 Ohms, ±0.1%, 0.33 W . . . (15909) (49673 No. H1060-21)	1	
-18	1120-1K	. . RESISTOR, FIXED, WIRE WOUND, 1K, ±0.1%, 0.33 W . . . . . (15909) (49673 No. H1060-31)	1	
-19	1120-3K	. . RESISTOR, FIXED, WIRE WOUND, 3K, ±0.1%, 0.33 W . . . . . (15909) (49673 No. H1060-20)	1	
-20	1120-5K	. . RESISTOR, FIXED, WIRE WOUND, 5K, ±0.1%, 0.33 W . . . . . (15909) (49673 No. H1060-19)	1	
-21	1120-10K	. . RESISTOR, FIXED, WIRE WOUND, 10K, ±0.1%, 0.33 W . . . . . (15909) (49673 No. H1060-18)	1	
-22	1120-30K	. . RESISTOR, FIXED, WIRE WOUND, 30K, ±0.1%, 0.33 W . . . . . (15909) (49673 No. H1060-17)	1	
-23	1120-50K	. . RESISTOR, FIXED, WIRE WOUND, 50K, ±0.1%, 0.33 W . . . . . (15909) (49673 No. H1060-16)	1	
-24	1120-100K	. . RESISTOR, FIXED, WIRE WOUND, 100K, ±0.1%, 0.33 W . . . . . (15909) (49673 No. H1060-15)	1	

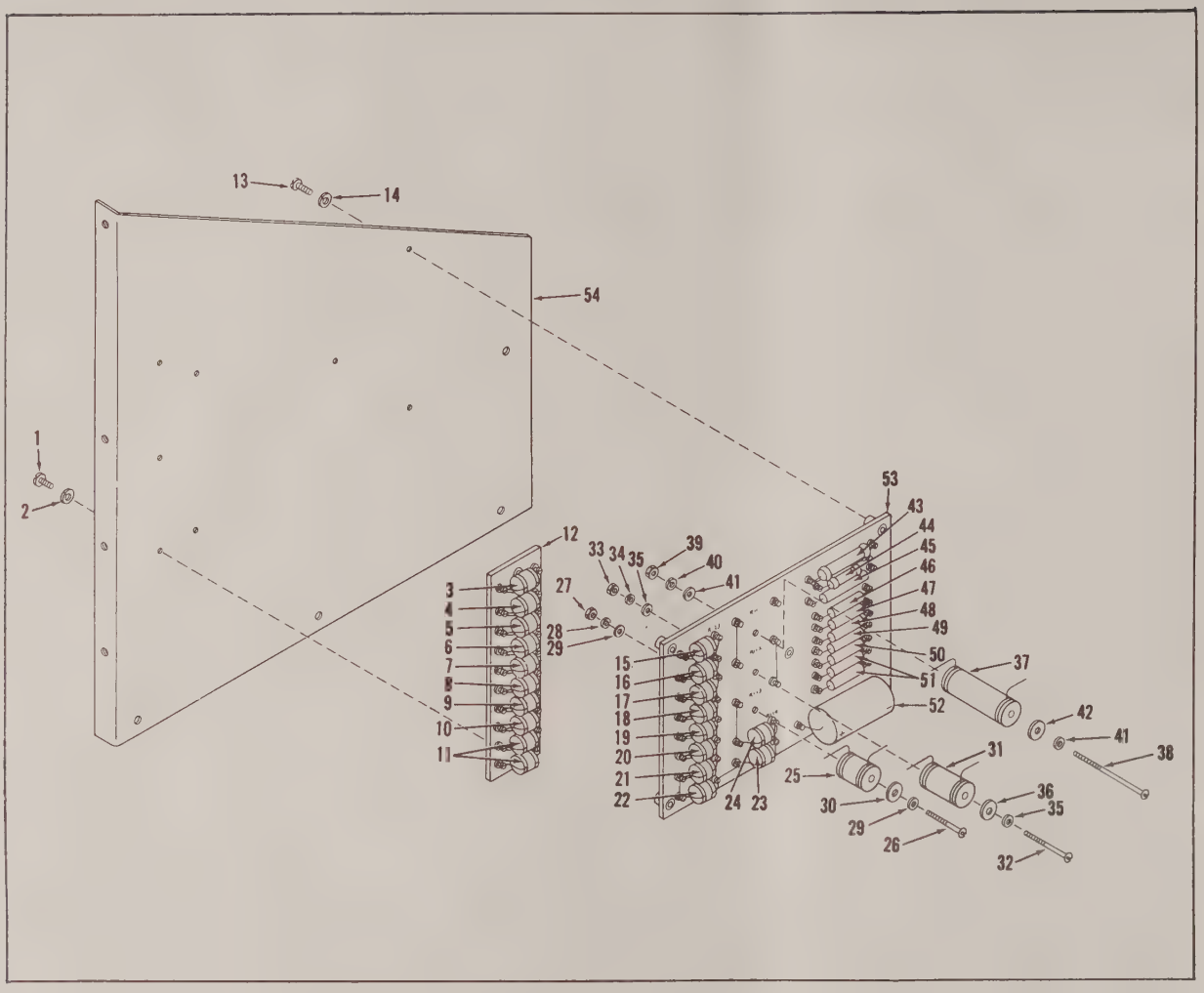

Figure 5. Electrical Equipment Chassis Assembly

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		ELECTRICAL EQUIPTMENT CHASSIS ASSEMBLY (CONT)		
5-25	1126-300K	. . RESISTOR, FIXED, WIRE WOUND, 300K, ±0.1%, 1 W . . . . . (15909) (49673 No. H1060-14)	1	
		(ATTACHING PARTS)		
-26	COML	. . SCREW, MACHINE, Rh, brs, ni plated, No. 6-32 NC-2A . . . . by 1-1/4 in. lg (49673 No. H1130-37)	1	
-27	COML	. . NUT, PLAIN, HEXAGON, Brs, ni plated, No. 6-32 NC-3B . . . . (49673 No. H1150-2)	1	
-28	COML	. . WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw . . . . (49673 No. H1160-40)	1	
-29	COML	. . WASHER, FLAT, Brs, ni plated, for No. 6 screw . . . . . (49673 No. H1230-34)	2	
-30	COML	. . INSULATOR, WASHER, Fibre, 1/2 OD by 1/16 in. thk, for . . . . No. 6 screw (49673 No. H1230-61)	1	

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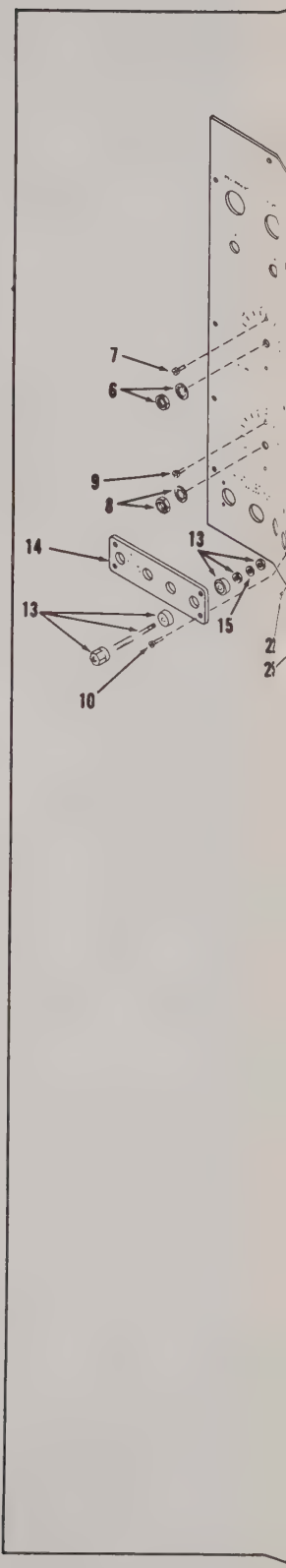
FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
		ELECTRICAL EQUIPMENT CHASSIS ASSEMBLY (CONT)		
4-31	1127-500K	. . RESISTOR, FIXED, WIRE WOUND, 500K, ±0.1%, 1.5 W . . . . . (15909) (49673 No. H1060-13)	1	
		(ATTACHING PARTS)		
-32	COML	. . SCREW, MACHINE, Rh, brs, ni plated, No. 6-32 NC-2A . . . . . by 1-1/2 in. lg (49673 No. H1130-10)	1	
-33	COML	. . NUT, PLAIN, HEXAGON, Brs, ni plated, No. 6-32 NC-3B . . . . (49673 No. H1150-2)	1	
-34	COML	. . WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw . . . . (49673 No. H1160-40)	1	
-35	COML	. . WASHER, FLAT, Brs, ni plated, for No. 6 screw . . . . . (49673 No. H1230-34)	2	
-36	COML	. . INSULATOR, WASHER, Fibre, blk, 1/2 OD by 1/16 in. thk, . . . for No. 6 screw (49673 No. H1230-61)	1	
		--------*--------		
-37	1128-1M	. . RESISTOR, FIXED, WIRE WOUND, 1 Mego, ±0.1%, 2 W . . . . . (15909) (49673 No. H1060-12)	1	
		(ATTACHING PARTS)		
-38	COML	. . SCREW, MACHINE, Rh, brs, ni plated, No. 6-32 NC-2A . . . . . by 2-1/2 in. lg (49673 No. H1130-16)	1	
-39	COML	. . NUT, PLAIN, HEXAGON, Brs, ni plated, No. 6-32 NC-3B . . . . (49673 No. H1150-2)	1	
-40	COML	. . WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw . . . . (49673 No. H1160-40)	1	
-41	COML	. . WASHER, FLAT, Brs, ni plated, for No. 6 screw . . . . . (49673 No. H1230-34)	2	
-42	COML	. . INSULATOR, WASHER, Fibre, blk, 1/2 OD by 1/16 in. thk, . . . for No. 6 screw (49673 No. H1230-61)	1	
		--------*--------		
-43	10X800WL	. . RESISTOR, FIXED, WIRE WOUND, 800 Ohms ±10%, 10 W . . . . (63743) (49673 No. H1100-175)	1	
-44	5X500WL	. . RESISTOR, FIXED, WIRE WOUND, 500 Ohms, ±10%, 5 W . . . . (63743) (49673 No. H1100-176)	1	
-45	BW2-200	. . RESISTOR, FIXED, WIRE WOUND, 200 Ohms, ±5%, 2W . . . . . (75042) (49673 No. H1100-168)	1	
-46	BW1-130	. . RESISTOR, FIXED, WIRE WOUND, 130 Ohms, ±5%, 1 W . . . . . (75042) (49673 No. H1100-169)	1	
-47	BW1-82	. . RESISTOR, FIXED, WIRE WOUND, 82 Ohms, ±10%, 1 W . . . . . (75042) (49673 No. H1100-170)	1	
-48	BW1-24	. . RESISTOR, FIXED, WIRE WOUND, 24 Ohms, ±10%, 1 W . . . . . (75042) (49673 No. H1100-171)	1	
-49	BW1-13	. . RESISTOR, FIXED, WIRE WOUND, 13 Ohms, ±10%, 1 W . . . . . (75042) (49673 No. H1100-172)	1	
-50	BW1-10	. . RESISTOR, FIXED, WIRE WOUND, 10 Ohms, ±10%, 1 W . . . . . (75042) (49673 No. H1100-173)	1	
-51	BW1-3.3	. . RESISTOR, FIXED, WIRE WOUND, 3.3 Ohms, ±10%, 1 W . . . . (75042) (49673 No. H1100-174)	2	
-52	BR4025	. . CAPACITOR, FIXED, ELECTROLYTIC, 40 UF, 250 VDCW . . . (14655) (49673 No. HA6474)	1	
-53	HC6601	. . TERMINAL BOARD (Inseparable) (49673)	1	
-54	HC6491	. CHASSIS, ELECTRICAL EQUIPMENT (49673)	1	

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		ELECTRICAL TEST PANEL		
6-	HD6403	PANEL, TEST, ELECTRICAL (See 19, figure 3 for next higher assembly) (49673)	REF	
-1	MAZDA6S6	. LAMP, INCANDESCENT (24455) (49673 No. HA2873)	2	
-2	75C112	. LIGHT, INDICATOR, Grn (shown in three parts) (72619) (49673 No. HA2854)	1	
-3	75C111	. LIGHT, INDICATOR, Red (shown in three parts) (72619) (49673 No. HA2856)	1	
-4	313003	. FUSE, CARTRIDGE (75915) (49673 No. HA6607)	2	
-5	341001	. FUSE HOLDER (Shown in five parts) (75915) (49673 No. HA1291)	2	
-6	HB6407	. SWITCH ASSEMBLY, AC mv sel (shown in three parts) (See figure 7 for breakdown) (49673)	1	
		(ATTACHING PARTS)		
-7	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 NC-2A by 5/16 in. lg (49673 No. H1260-23)	2	
		--------*--------		
-8	HB6408	. SWITCH ASSEMBLY, AC-DC voltage range sel (shown in three parts) (See figure 7 for breakdown) (49673)	1	
		(ATTACHING PARTS)		
-9	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 NC-2A by 5/16 in. lg (49673 No. H1260-23)	2	
		--------*--------		
6-	HB6591	. TERMINAL BOARD (49673)	1	
		(ATTACHING PARTS)		
-10	COML	. SCREW, MACHINE, Ov hd, brs, ni plated, No. 6-32 NC-2A by 1/2 in. lg (49673 No. H1650-24)	4	
-11	COML	. NUT, PLAIN, HEXAGON, Brs, ni plated, No. 6-32 NC-3B (49673 No. H1150-49)	4	
-12	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw (49673 No. H1160-40)	4	
		--------*--------		
-13	DF30BC	. . POST, BINDING (Shown in six parts) (58474) (49673 No. HA6481-1)	4	
-14	HA6592	. . TERMINAL BOARD (49673)	1	
-15	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 10 screw (49673 No. H1160-39)	4	
-16	ST52K	. SWITCH, TOGGLE (Shown in four parts) (81350) (49673 No. HA4337)	1	
-17	W2	. TRANSFORMER, VARIABLE, POWER (Discard knob from purchased assembly) (24655) (49673 No. HA6478)	2	
		(ATTACHING PARTS)		
-18	COML	. SCREW, MACHINE, Bind. hd, stl, ni plated, No. 10-32 NC-2A by 3/8 in. lg (49673 No. H1260-55)	6	
		--------*--------		
-19	W2S11	. TRANSFORMER, VARIABLE, POWER, W/micro-switch (Discard knob from purchased assembly) (24655) (49673 No. HA6186)	2	
		(ATTACHING PARTS)		
-20	COML	. SCREW, MACHINE, Bind. hd, stl, ni plated, No. 10-32 NC-2A by 3/8 in. lg (49673 No. H1260-55)	6	
		--------*--------		
-21	HA7240	. NUT, PLAIN, PLATE (49673)	4	
		(ATTACHING PARTS)		
-22	COML	. RIVET, SOLID, Csk fh, 3/32 dia by 1/4 in. lg (49673 No. H1170-64)	4	
		--------*--------		
-23	3037L	. SWITCH, LEVER (Shown in two parts) (82389) (49673 No. HB6434)	1	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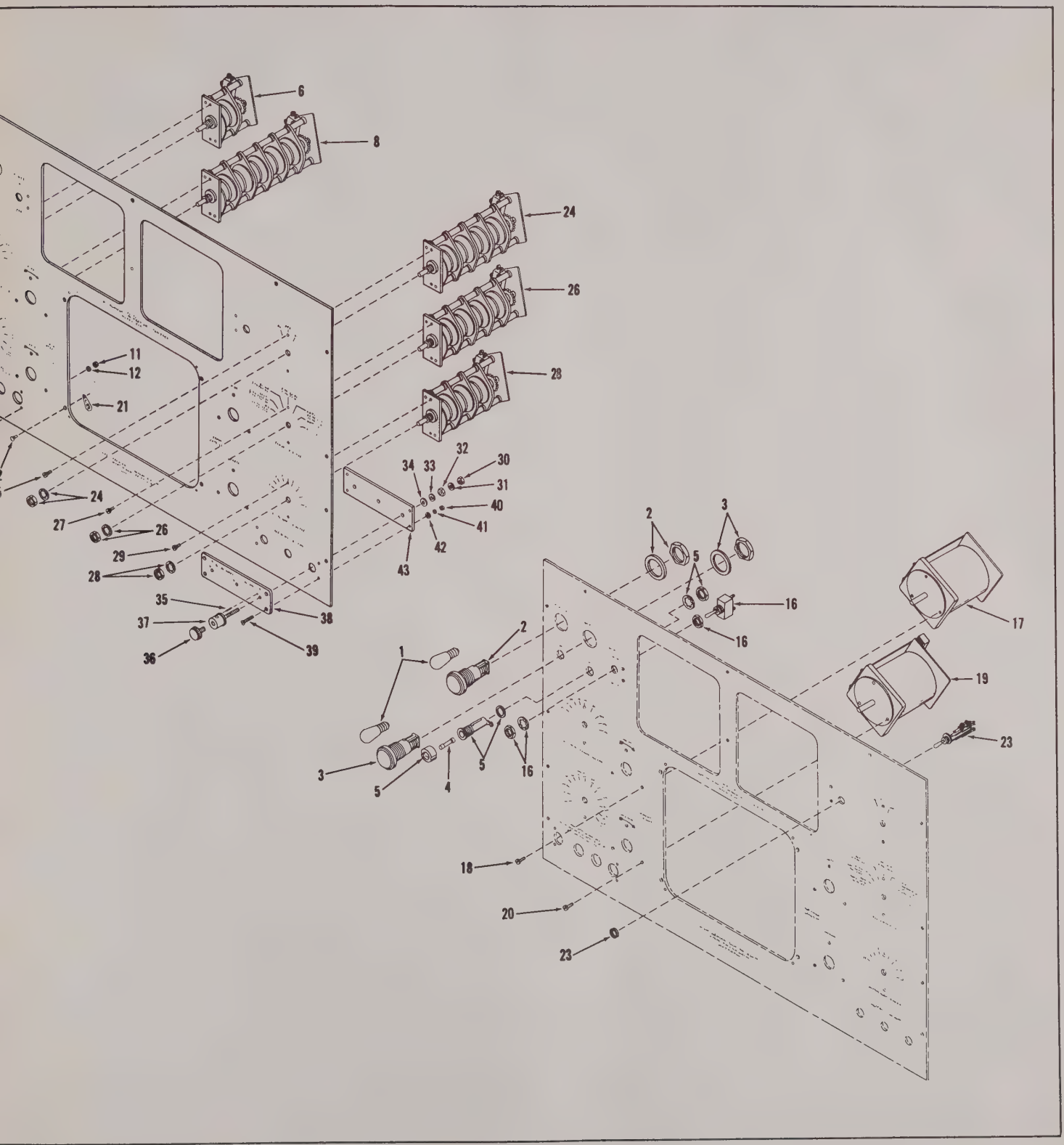


Figure 6. Electrical Test Panel

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		ELECTRICAL TEST PANEL (CONT)		
6-24	HB6404	. SWITCH ASSEMBLY, AC-DC output sel (shown in three parts) . . . . (See figure 8 for breakdown) (49673)	1	
		(ATTACHING PARTS)		
-25	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 . . . . . NC-2A by 5/16 in. lg (49673 No. H1260-23)	2	
		--------*--------		
-26	HB6405	. SWITCH ASSEMBLY, Range sel (shown in three parts) . . . . . (See figure 8 for breakdown) (49673)	1	
		(ATTACHING PARTS)		
-27	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 . . . . . NC-2A by 5/16 in. lg (49673 No. H1260-23)	2	
		--------*--------		
-28	HB6406	. SWITCH ASSEMBLY, Amp sel (shown in three parts) . . . . . (See figure 8 for breakdown) (49673)	1	
		(ATTACHING PARTS)		
-29	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 . . . . . NC-2A by 5/16 in. lg (49673 No. H1260-23)	2	
		--------*--------		
-30	COML	. NUT, PLAIN, HEXAGON, Brs, ni plated, No. 10-32 NF-3B . . . . (49673 No. H1150-83)	3	
-31	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw . . . . . (49673 No. H1160-39)	3	
6-	HB6499	. TERMINAL BOARD (49673)	1	
6-	HA6633	. . POST, BINDING (49673)	3	
		(ATTACHING PARTS)		
-32	COML	. . NUT, PLAIN, HEXAGON, Brs, ni plated, No. 10-32 NF-3B . . . (49673 No. H1150-83)	3	
-33	COML	. . WASHER, LOCK, Split, stl, cad. plated, for No. 10 screw . . . . (49673 No. H1160-39)	3	
-34	COML	. . WASHER, FLAT, Brs, ni plated, for No. 10 screw . . . . . (49673 No. H1230-32)	3	
		--------*--------		
-35	1-16D1-4LG TYPE 2	. . . PIN, GROOVED, HEADLESS . . . . . (91738) (49673 No. HA9989)	1	
-36	HA9988	. . . THUMBSCREW (49673)	1	
-37	HB9987	. . . BASE, POST, BINDING (49673)	1	
-38	HA6594	. . TERMINAL BOARD, Stenciled (49673)	1	
		(ATTACHING PARTS)		
-39	COML	. . SCREW, MACHINE, Ov hd, brs, ni plated, No. 6-32 . . . . . NC-2A by 3/4 in. lg (49673 No. H1650-23)	4	
-40	COML	. . NUT, PLAIN, HEXAGON, Brs, ni plated, No. 6-32 . . . . . NC-2A by 5/16 in. lg (49673 No. H1150-49)	4	
-41	COML	. . WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw . . . . (49673 No. H1160-40)	4	
-42	COML	. . WASHER, FLAT, Brs, ni plated, for No. 6 screw . . . . . (49673 No. H1230-34)	4	
		--------*--------		
-43	HB6596	. . TERMINAL BOARD (49673)	1	
-44	HE6497	. PANEL, BLANK (49673)	1	

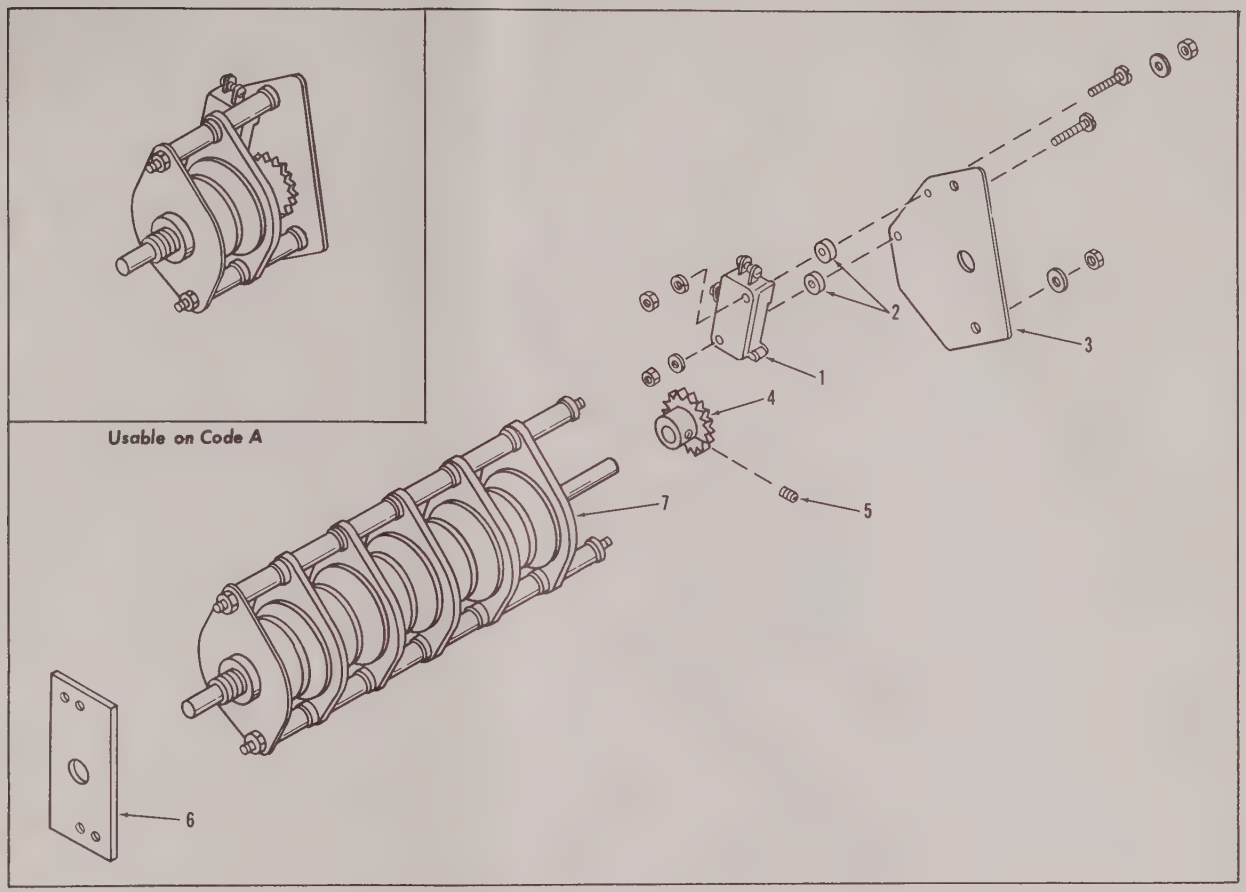


Figure 7. AC Switch

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		AC SWITCH ASSEMBLY		
7-	HB6407	SWITCH ASSEMBLY, AC mv sel (See 6, figure 6 for next higher assembly) (49673)	REF	A
	HB6408	SWITCH ASSEMBLY, AC-DC voltage range sel (See 8, figure 6 for next higher assembly) (49673)	REF	B
-1	V3-1JV5	. SWITCH, SENSITIVE (Shown in seven parts) (40228) (49673 No. HA6429)	1	
-2	COML	. INSULATOR, WASHER, Blk linen bakelite, 1/8 ID by 5/16 OD by 1/16 in. thk (49673 No. H1230-5)	2	
-3	HA6997	. BRACKET, SWITCH, Rear (49673)	1	
-4	HA6690	. DETENT, SWITCH (49673)	1	
		(ATTACHING PARTS)		
-5	COML	. SETSCREW, Hex hd, stl, cad. plated pt, No. 8-32 NC-2A by 3/16 in. lg (49673 No. H1660-19)	2	
		--------*--------		
-6	HA6689	. BRACKET, SWITCH, Front (49673)	1	
-7	HB6422	. SWITCH, ROTARY, One sect. (49673)	1	A
	HB6418	. SWITCH, ROTARY, Five sect. (49673)	1	B

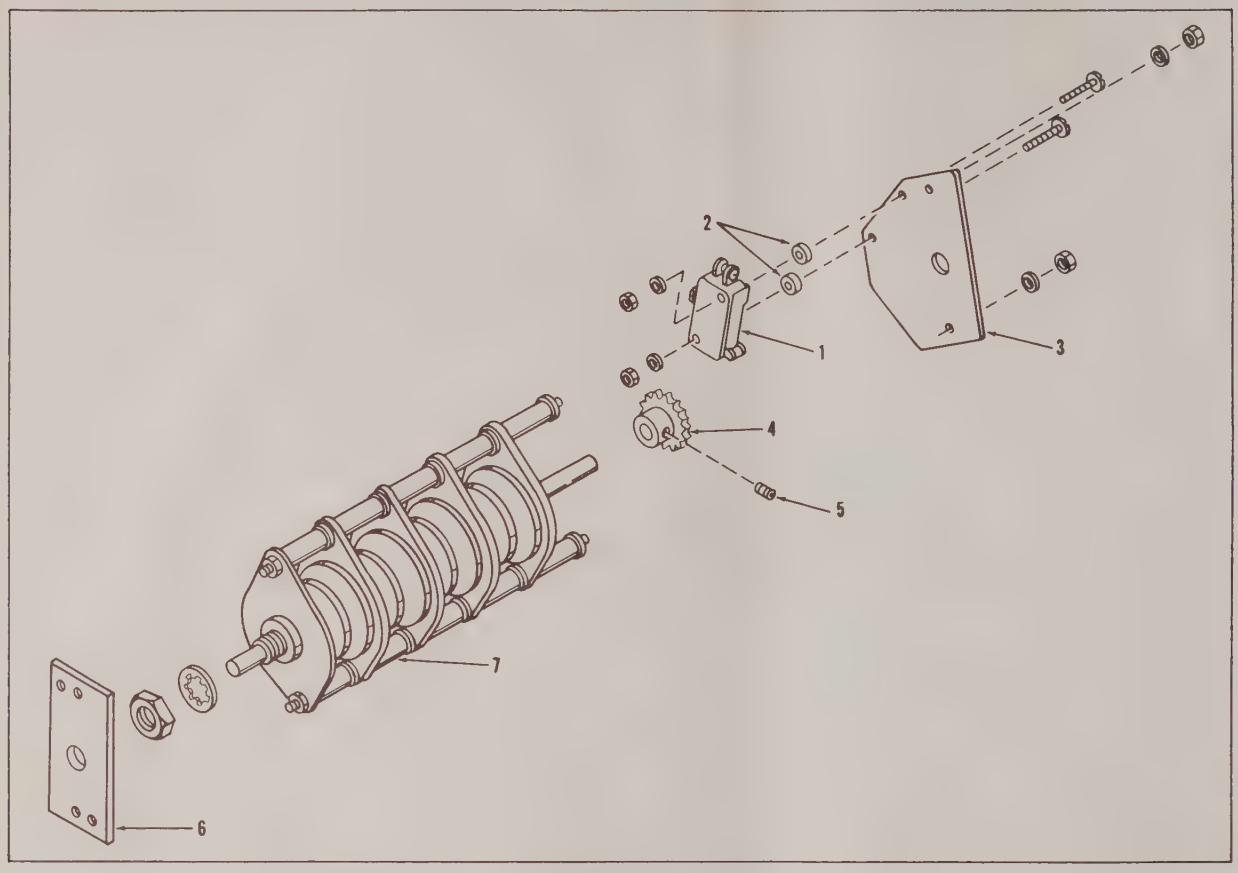


Figure 8. AC-DC Switch

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		AC-DC SWITCH ASSEMBLY		
8-	HB6404	SWITCH ASSEMBLY, AC-DC output sel (See 24, figure 6 for next higher assembly) (49673)	REF	C
	HB6405	SWITCH ASSEMBLY, Range sel (See 26, figure 6 for next higher assembly) (49673)	REF	D
	HB6406	SWITCH ASSEMBLY, Amp sel (See 28, figure 6 for next higher assembly) (49673)	REF	E
-1	V3-1JV5	. SWITCH, SENSITIVE (Shown in seven parts) (40228) (49673 No. HA6429)	1	
-2	COML	. INSULATOR, WASHER, Blk linen bakelite, 1/8 ID by 5/16 OD by 1/16 in. thk (49673 No. H1230-5)	2	
-3	HA6997	. BRACKET, SWITCH, Rear (49673)	1	
-4	HA6690	. DETENT, SWITCH (49673)	1	
		(ATTACHING PARTS)		
-5	COML	. SETSCREW, Hex hd, stl, cad. plated pt, No. 8-32 NC-2A by 3/16 in. lg (49673 No. H1660-19)	2	
		--------*--------		
-6	HA6689	. BRACKET, SWITCH, Front (49673)	1	
-7	HB6476	. SWITCH, ROTARY, Four sect. (Shown in seven parts) (49673)	1	C
	HB6420	. SWITCH, ROTARY, Four sect. (Shown in seven parts) (49673)	1	D
	HB6419	. SWITCH, ROTARY, Three sect. (Shown in seven parts) (49673)	1	E

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		ELECTRICAL EQUIPMENT CHASSIS ASSEMBLY		
9-	HD6410	CHASSIS ASSEMBLY, ELECTRICAL EQUIPMENT, Bottom (See 27, figure 3 for next higher assembly) (49673)	REF	
-1	COML	. SCREW, MACHINE, Ov hd, brs, ni plated, No. 6-32 NC-2A by 1/2 in. lg (49673 No. H1650-24)	4	
-2	960SS	. KNOB, Black (88299) (49673 No. HA6630)	1	
-3	910SS	. KNOB, Black (88299) (49673 No. HA6479)	1	
-4	910SS	. KNOB, White (88299) (49673 No. HA6629)	4	
-5	HD6411	. PANEL, TEST, ELECTRICAL, Wheatstone bridge (See figure 10 for breakdown) (49673)	1	
9-	HD6622	. PLATE ASSEMBLY, Bottom (49673)	1	
		(ATTACHING PARTS)		
-6	COML	. SCREW, MACHINE, Bind. hd, stl, cad. plated, No. 10-24 NC-2A by 1/2 in. lg (49673 No. H1490-23)	10	
-7	C8044-1024-67	. NUT, SHEET SPRING (78553) (49673 No. HA6681)	10	
		--------*--------		
-8	HB6624	. . SLIDE, Wood (49673)	2	
		(ATTACHING PARTS)		
-9	COML	. . SCREW, MACHINE, Bind. hd, stl, cad. plated, No. 8-32 by 1 in. lg (49673 No. H1260-119)	6	
-10	COML	. . WASHER, LOCK, Split, Stl, cad. plated, for No. 8 screw (49673 No. H1160-78)	6	
-11	48448	. . NUT, PLAIN, ROUND (61864) (49673 No. HA6652)	6	
		--------*--------		
-12	HA6641	. . STEEL BAR, REINFORCING (49673)	2	
-13	HD6623	. . PLATE, Bottom (49673)	1	
-14	HB6625	. BRACE, CORNER (49673)	1	
-15	H1240-3	. GROMMET, RUBBER (49673)	2	
-16	HD6577	. PANEL ASSEMBLY, RELAY (See figure 11 for breakdown) (49673)	1	
		(ATTACHING PARTS)		
-17	COML	. SCREW, MACHINE, Bind. hd, stl, cad. plated, No. 8-32 NC-2A by 3/8 in. lg (49673 No. H1260-61)	4	
-18	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 8 screw (49673 No. H1160-42)	4	
		--------*--------		
-19	HA6475	. CLIP, ELECTRICAL (49673)	1	
-20	836	. ELECTRON TUBE (49671) (49673 No. HA2859)	1	
-21	123-210-1	. SOCKET, ELECTRON TUBE (74970) (49673 No. HA2874)	1	
		(ATTACHING PARTS)		
-22	COML	. SCREW, MACHINE, Bind. hd, stl, cad. plated, No. 8-32 NC-2A by 1 in. lg (49673 No. H1260-119)	2	
-23	COML	. WASHER, LOCK, Split, stl cad. plated, for No. 8 screw (49673 No. H1160-42)	2	
-24	COML	. WASHER, FLAT, Brs, ni plated, for No. 8 screw (49673 No. H1230-31)	2	
-25	COML	. WASHER, INSULATOR, Fibre, for No. 8 screw (49673 No. H1230-11)	2	
		--------*--------		
-26	HB6442	. TRANSFORMER, POWER, STEP-DOWN (49673)	1	
		(ATTACHING PARTS)		
-27	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 8-32 NC-2A by 5/16 in. lg (49673 No. H1260-40)	2	
-28	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 8 screw (49673 No. H1160-42)	2	
		--------*--------		

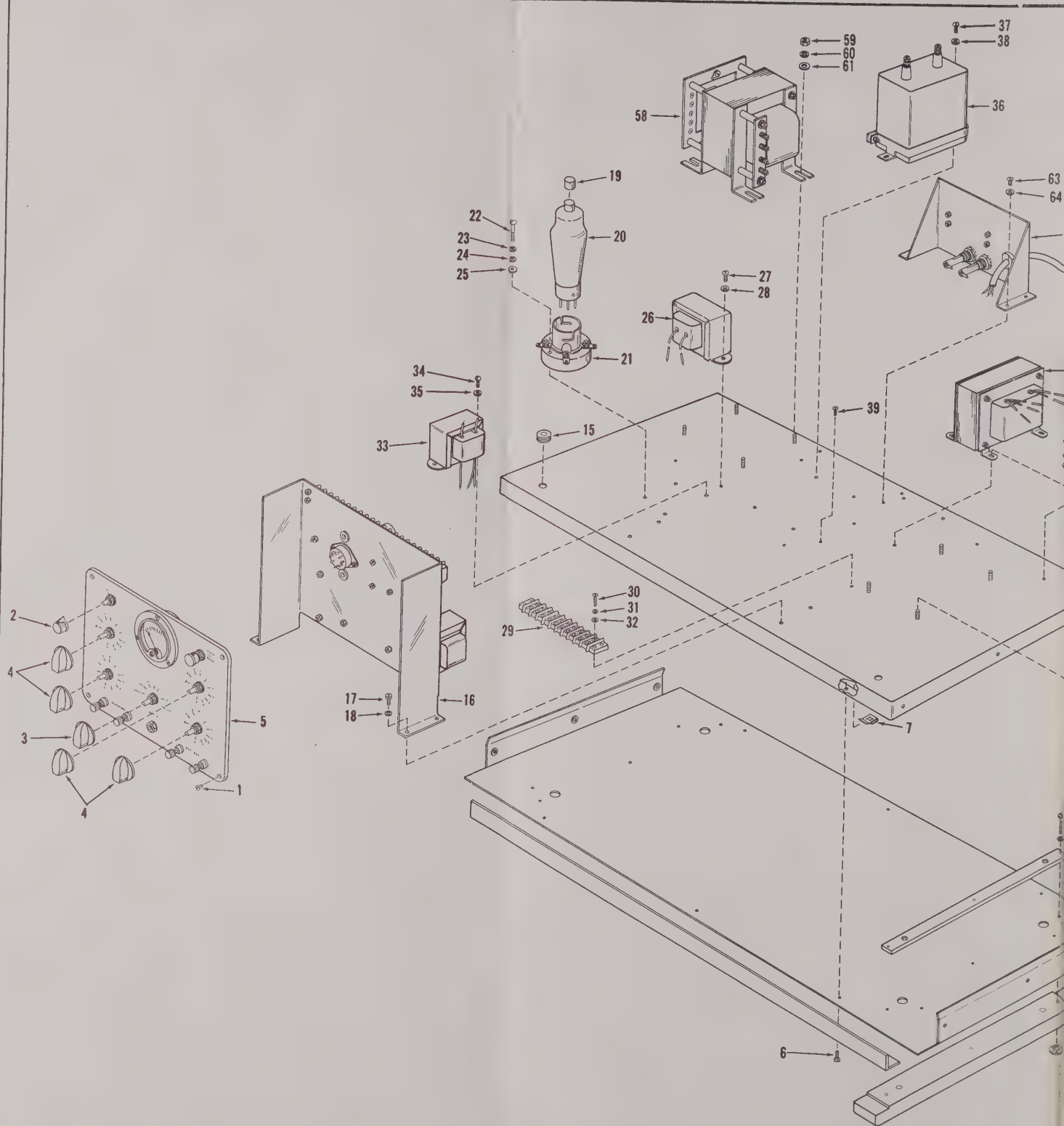
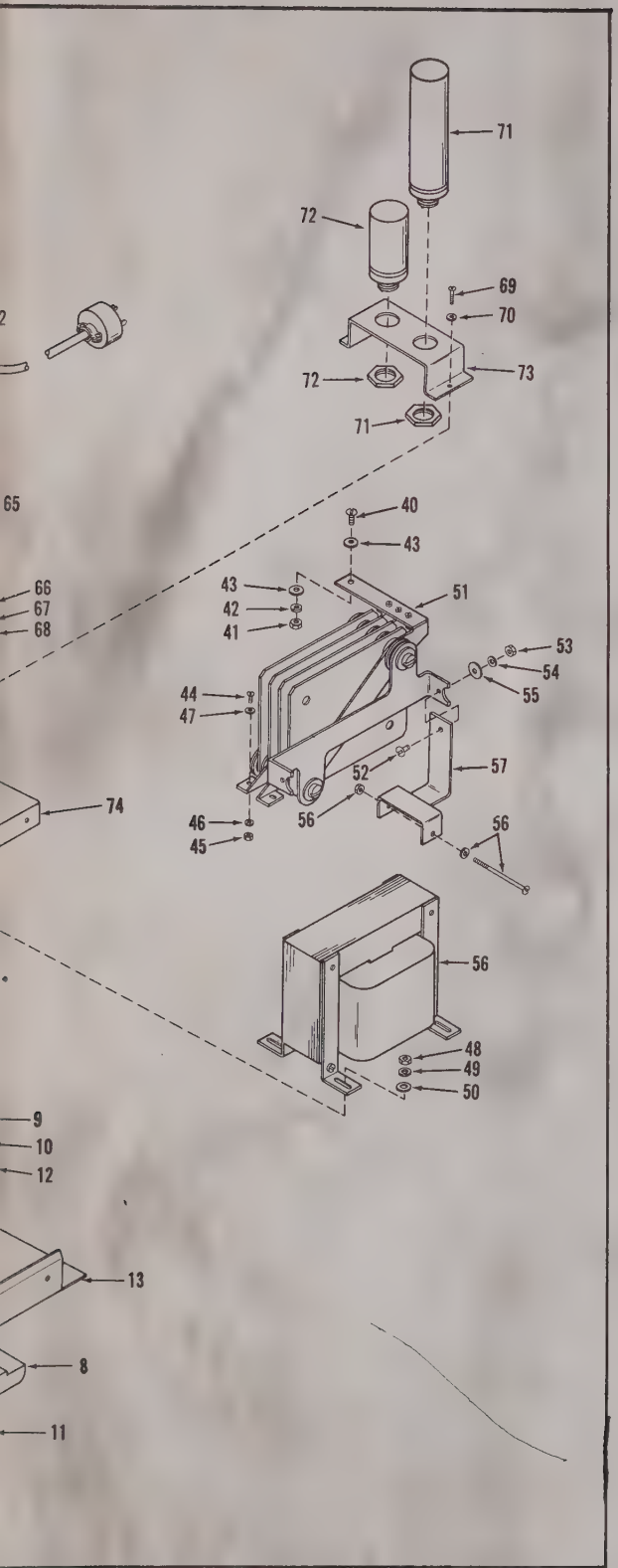


Figure 9. Electrical Equi



oment Chassis Assembly

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		ELECTRICAL EQUIPMENT CHASSIS ASSEMBLY (CONT)		
9-29	10-141	. TERMINAL BOARD (75173) (49673 No. HA8278)	1	
		(ATTACHING PARTS)		
-30	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 NC-2A by 5/8 in. lg (49673 No. H1260-9)	2	
-31	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw (49673 No. H1160-40)	2	
-32	COML	. WASHER, FLAT, Brs, ni plated, for No. 6 screw (49673 No. H1230-34)	2	
		--------*--------		
-33	HB6441	. REACTOR, 10 H, 100 MA, 5000 V (49673)	1	
		(ATTACHING PARTS)		
-34	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 8-32 NC-2A by 5/16 in. lg (49673 No. H1260-40)	2	
-35	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 8 screw (49673 No. 1160-42)	2	
		--------*--------		
-36	20SA400	. CAPACITOR, FIXED, ELECTROLYTIC, 4 UF, ±20%, 2000 VDCW (74861) (49673 No. HA6430)	2	
		(ATTACHING PARTS)		
-37	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 8-32 NC-2A by 5/16 in. lg (49673 No. H1260-40)	4	
-38	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 8 screw (49673 No. H1160-42)	4	
		--------*--------		
-39	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 NC-2A by 3/8 in. lg (49673 No. H1260-29)	1	
-40	COML	. SCREW, MACHINE, Bind. hd, stl, ni plated, No. 10-32 NC-2A by 3/8 in. lg (49673 No. H1260-55)	1	
-41	COML	. NUT, PLAIN, HEXAGON, Brs, ni plated, No. 10-32 NC-3B (49673 No. H1150-50)	1	
-42	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 10 screw (49673 No. H1160-39)	1	
-43	COML	. WASHER, FLAT, Brs, ni plated, for No. 10 screw (49673 No. H1230-32)	2	
-44	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 8-32 NC-2A by 5/16 in. lg (49673 No. H1260-40)	2	
-45	COML	. NUT, PLAIN, HEXAGON, Brs, ni plated, No. 8-32 NC-3B (49673 No. H1150-50)	2	
-46	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 8 screw (49673 No. H1160-42)	2	
-47	COML	. WASHER, FLAT, Brs, ni plated, for No. 8 screw (49673 No. H1230-31)	4	
9-	HD6590	. REACTOR AND RECTIFIER ASSEMBLY (49673)	1	
		(ATTACHING PARTS)		
-48	COML	. NUT, PLAIN, HEXAGON, Stl, cad. plated, 1/4-20 NC-3B (49673 No. H1150-60)	4	
-49	COML	. WASHER, LOCK, Split, stl, cad. plated, for 1/4 in. screw (49673 No. H1160-29)	4	
-50	COML	. WASHER, FLAT, Stl, cad. plated, for 1/4 in. screw (49673 No. H1230-38)	4	
		--------*--------		
-51	34D4829	. . RECTIFIER, METALLIC, 4 VACW, 2 VDCW, 20 Amp (21964) (49673 No. HB3089)	1	
		(ATTACHING PARTS)		
-52	COML	. . SCREW, MACHINE, Rh, stl, cad. plated, 1/4-20 NC-2A by 1/2 in. lg (49673 No. H1130-44)	2	
-53	COML	. . NUT, PLAIN, HEXAGON, Stl, cad. plated, 1/4-20 NC-3B (49673 No. H1150-60)	2	
-54	COML	. . WASHER, LOCK, Split, stl, cad. plated, for 1/4 in. screw (49673 No. H1160-29)	2	
-55	COML	. . WASHER, FLAT, Stl, cad. plated, for 1/4 in. screw (49673 No. H1230-38)	2	
		--------*--------		

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		ELECTRICAL EQUIPMENT CHASSIS ASSEMBLY (CONT)		
9-56	HB6444	. . REACTOR, 0.015 H, 0.096 Ohms, 1.2 Amp, 1500 V (Shown in four parts) (49673)	1	
-57	HC6589	. . BRACKET, RECTIFIER (49673)	2	
-58	HB6477	. TRANSFORMER, POTENTIAL (49673)	1	
		(ATTACHING PARTS)		
-59	COML	. NUT, PLAIN, HEXAGON, Stl, cad. plated, 1/4-20 NC-3B (49673 No. H1150-60)	4	
-60	COML	. WASHER, LOCK, Split, stl, cad. plated, for 1/4 in. screw (49673 No. H1160-29)	4	
-61	COML	. WASHER, FLAT, Stl, cad. plated, for 1/4 in. screw (49673 No. H1230-38)	4	
		--------*--------		
-62	HB6599	. PANEL ASSEMBLY, POWER INPUT (See figure 12 for breakdown) (49673)	1	
		(ATTACHING PARTS)		
-63	COML	. SCREW, MACHINE, Bind. hd, stl, cad. plated, No. 8-32 NC-2A by 3/8 in. lg (49673 No. H1260-61)	4	
-64	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 8 screw (49673 No. H1160-42)	4	
		--------*--------		
-65	HB6445	. TRANSFORMER, POWER, STEP-DOWN (49673)	1	
		(ATTACHING PARTS)		
-66	COML	. SCREW, MACHINE, Bind. hd, stl, ni plated, No. 10-32 NC-2A by 3/8 in. lg (49673 No. H1260-55)	4	
-67	COML	. WASHER, LOCK, Split, ph brz, cad. plated, for No. 10 screw (49673 No. H1160-10)	4	
-68	COML	. WASHER, FLAT, Brs, ni plated, for No. 10 screw (49673 No. H1230-32)	4	
		--------*--------		
9-	HB6588	. CAPACITOR ASSEMBLY (49673)	1	
		(ATTACHING PARTS)		
-69	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 NC-2A by 3/8 in. lg (49673 No. H1260-29)	2	
-70	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw (49673 No. H1160-40)	2	
		--------*--------		
-71	KP10186	. . CAPACITOR, FIXED, ELECTROLYTIC, 4000 UF, 10 V (shown in two parts) (14655) (49673 No. HA6472)	1	
-72	KP10187	. . CAPACITOR, FIXED, ELECTROLYTIC, 2000 UF, 10 V (shown in two parts) (14655) (49673 No. HA6473)	1	
-73	HB6579	. . RETAINER, CAPACITOR (49673)	1	
-74	HD6412	. CHASSIS, ELECTRICAL EQUIPMENT (49673)	1	

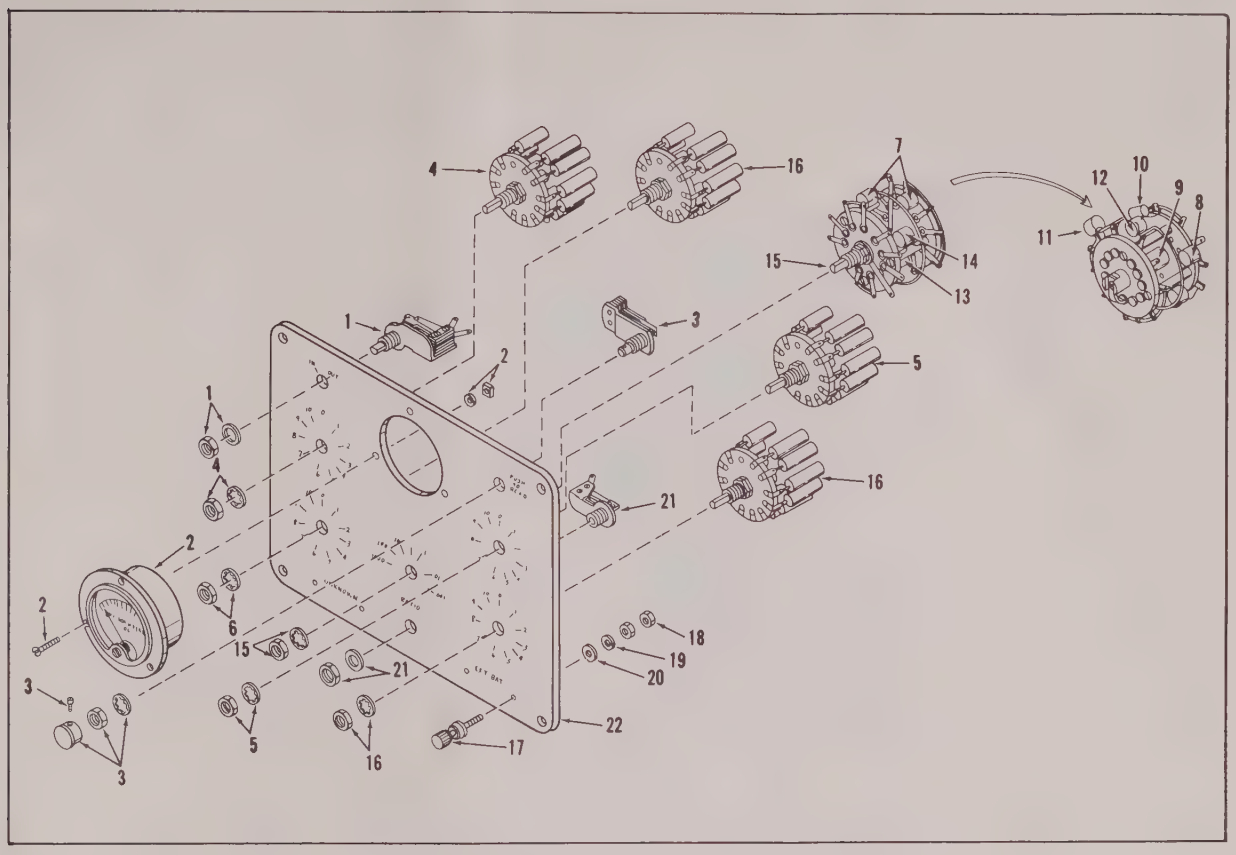


Figure 10. Electrical Test Panel

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		ELECTRICAL TEST PANEL		
10-	HD6411	PANEL, TEST, ELECTRICAL, Wheatstone bridge . . . . . (See 5, figure 9 for next higher assembly) (49673)	REF	
-1	730	. SWITCH, ROTARY (Shown in three parts) . . . . . (37942) (49673 No. HA6467)	1	
-2	506S80562	. AMMETER, DC (Shown in four parts) . . . . . (65092) (49673 No. HA6606)	1	
-3	FF1004	. SWITCH, PUSH (Shown in five parts) . . . . . (82389) (49673 No. HB6568)	1	
-4	HA6426	. RESISTOR, DECADE, 10 K, 1 K/Step, ±0.1%, 1 W/step . . . . . (Shown in three parts) (49673)	1	
-5	436	. RESISTOR, DECADE, 10 Ohms, 1 Ohm/step, ±0.25% . . . . . (Shown in three parts) (54294) (49673 No. HA6423)	1	
-6	438	. RESISTOR, DECADE, 1 K, 100 Ohms/step, ±0.1% . . . . . (Shown in three parts) (54294) (49673 No. HA6425)	1	
10-	HC6578	. RATIO SWITCH ASSEMBLY (49673)	1	
-7	1120-1K	. . RESISTOR, FIXED, WIRE WOUND, 1 K, ±0.1%, 0.33 W . . . . . (15909) (49673 No. H1060-31)	2	
-8	1120-10K	. . RESISTOR, FIXED, WIRE WOUND, 10 K, ±0.1%, 0.33 W . . . . . (15909) (49673 No. H1060-18)	1	
-9	1120-100K	. . RESISTOR, FIXED, WIRE WOUND, 100 K, 0.1%, 0.33 W . . . . . (15909) (49673 No. H1060-15)	1	
-10	5F20WL	. . RESISTOR, FIXED, WIRE WOUND, 20 Ohms, ±10%, 5 W . . . . . (63743) (49673 No. H1100-189)	1	

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
10-11	1120-100	. . RESISTOR, FIXED, WIRE WOUND, 100 Ohms, ±0.1%, 0.33 W . . . (15909) (49673 No. H1060-23)	1	
-12	1120-10	. . RESISTOR, FIXED, WIRE WOUND, 10 Ohms, ±0.1%, 0.33 W . . . (15909) (49673 No. H1060-26)	1	
-13	1120-1	. . RESISTOR, FIXED, WIRE WOUND, 1 Ohm, ±0.1%, 0.33 W . . . . (15909) (49673 No. H1060-29)	1	
-14	1120-90K	. . RESISTOR, FIXED, WIRE WOUND, 90 K, ±0.1%, 0.33 W . . . . . (15909) (49673 No. H1060-30)	1	
-15	4620B	. . SWITCH, ROTARY (Shown in three parts) . . . . . (54294) (49673 No. HB6416)	1	
-16	437	. RESISTOR, DECADE, 100 Ohms, 10 Ohms/step, ±0.1% . . . . . (Shown in three parts) (54294) (49673 No. HA6424)	1	
-17	7765	. POST, BINDING (72825) (49673 No. HA3688)	4	
		(ATTACHING PARTS)		
-18	COML	. NUT, PLAIN, HEXAGON, Brs, ni plated, No. 8-32 NC-3B . . . . . (49673 No. H1150-50)	8	
-19	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 8 screw . . . . . (49673 No. H1160-42)	4	
-20	COML	. WASHER, FLAT, Brs, ni plated, 0.171 ID by 3/8 OD by 1/32 in. . . thk (49673 No. H1230-77)	4	
		--------*--------		
-21	703B	. JACK, TELEPHONE (Shown in three parts) . . . . . (37942) (49673 No. HA6605)	1	
-22	HC6485	. PANEL, BLANK (49673)	1	

RELAY PANEL ASSEMBLY

11-	HD6577	PANEL ASSEMBLY, RELAY (See 16, figure 9 for next . . . . . higher assembly) (49673)	REF	
-1	20-141	. TERMINAL BOARD (75173) (49673 No. HA6489)	1	
		(ATTACHING PARTS)		
-2	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 . . . . . NC-2A by 5/8 in. lg (49673 No. H1260-9)	4	
-3	COML	. NUT, PLAIN, HEXAGON, Brs, ni plated, No. 6-32 NC-3B . . . . . (49673 No. H1150-49)	4	
-4	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw . . . . . (49673 No. H1160-40)	4	
-5	COML	. WASHER, FLAT, Brs, ni plated, for No. 6 screw . . . . . (49673 No. H1230-34)	4	
		--------*--------		

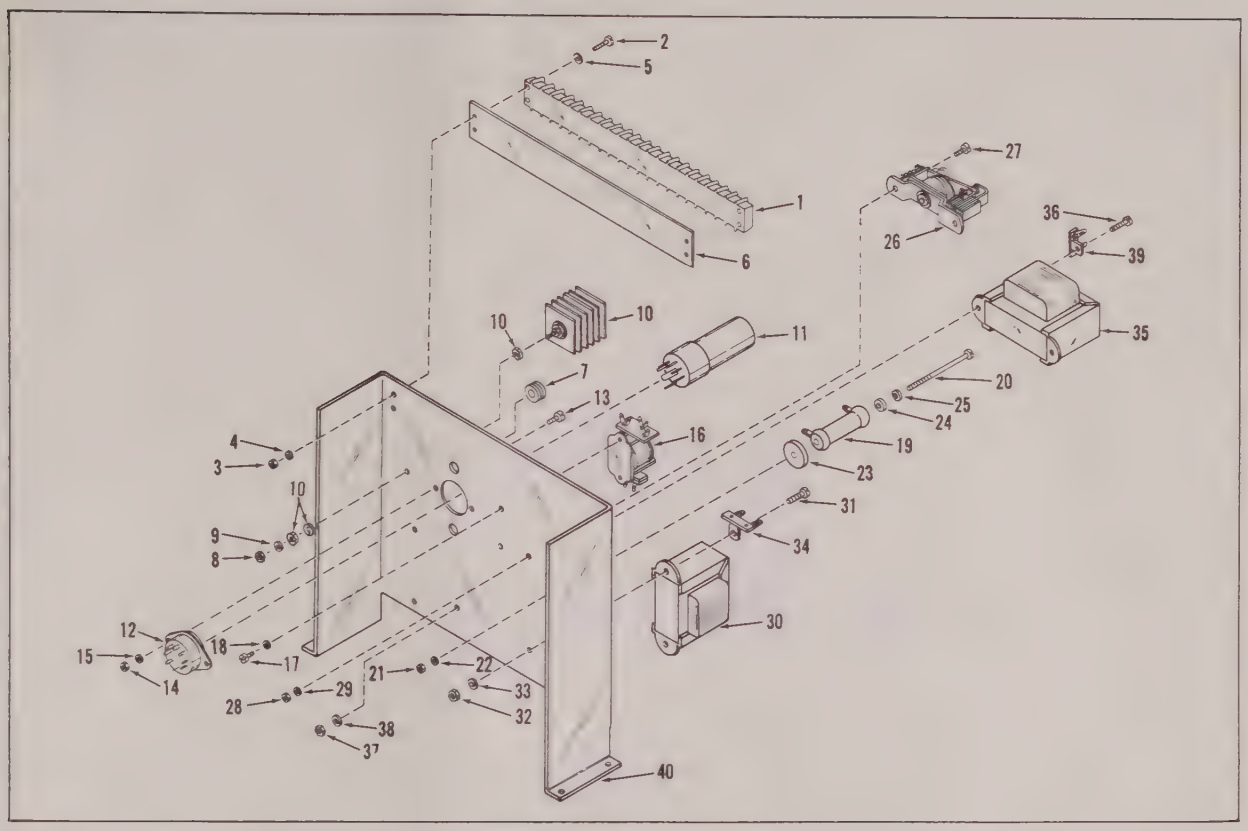


Figure 11. Relay Panel Assembly

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		RELAY PANEL ASSEMBLY		
11-6	20-141MS	. PLATE, MARKING, BLANK (75173) (49673 No. HA6549)	1	
-7	2610	. GROMMET, RUBBER (70485) (49673 No. H1240-2)	2	
-8	COML	. NUT, PLAIN, HEXAGON, Brs, ni plated, No. 6-32 NC-3B . . . . . (49673 No. H1150-50)	1	
-9	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw . . . . . (49673 No. H1160-42)	1	
-10	103B1AY1	. RECTIFIER, METALLIC (Shown in four parts) . . . . . (21964) (49673 No. HA4444)	1	
-11	115NO-30	. RELAY, THERMAL (70563) (49673 No. HA3082)	1	
-12	77MIP8	. SOCKET, RELAY (02660) (49673 No. HA2628)	1	
		(ATTACHING PARTS)		
-13	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 . . . . . NC-2A by 5/16 in. lg (49673 No. H1260-29)	2	
-14	COML	. NUT, PLAIN, HEXAGON, Brs, ni plated, No. 6-32 NC-3B . . . . . (49673 No. H1150-46)	2	
-15	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw . . . . . (49673 No. H1160-40)	2	

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FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		RELAY PANEL ASSEMBLY (CONT)		
11-16	KL12D	. RELAY, ARMATURE (77342) (49673 No. HB6653)	1	
		(ATTACHING PARTS)		
-17	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 NC-2A by 3/16 in. lg (49673 No. H1260-17)	2	
-18	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw (49673 No. H1160-40)	2	
		--------*--------		
-19	0215	. RESISTOR, FIXED, WIRE WOUND, 10 K, ±10%, 25 W (44655) (49673 No. H1100-188)	1	
		(ATTACHING PARTS)		
-20	COML	. SCREW, MACHINE, Rh, brs, ni plated, No. 6-32 NC-2A by 2-1/2 in. lg (49673 No. H1130-16)	1	
-21	COML	. NUT, PLAIN, HEXAGON, Brs, ni plated, No. 6-32 NC-3B (49673 No. H1150-49)	1	
-22	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw (49673 No. H1160-40)	1	
-23	HA5395	. WASHER, SHOULDERED (49673)	1	
-24	COML	. INSULATOR, WASHER, Bakelite, 9/16 OD, for No. 6 screw (49673 No. H1230-2)	1	
-25	COML	. WASHER, FLAT, Brs, ni plated, for No. 6 screw (49673 No. H1230-34)	1	
		--------*--------		
-26	MR5D	. RELAY, ARMATURE (77342) (49673 No. HA6163)	1	
		(ATTACHING PARTS)		
-27	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 NC-2A by 5/16 in. lg (49673 No. H1260-29) . . .	2	
-28	COML	. NUT, PLAIN, HEXAGON, Brs, ni plated, No. 6-32 NC-3B (49673 No. H1150-49)	2	
-29	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw (49673 No. H1160-40)	2	
		--------*--------		
11-30	HB6435	. TRANSFORMER, POWER, STEP-DOWN (49673)	2	
		(ATTACHING PARTS)		
-31	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 8-32 NC-2A by 5/16 in. lg (49673 No. H1260-40)	4	
-32	COML	. NUT, PLAIN, HEXAGON, Brs, ni plated, No. 8-32 NC-3B (49673 No. H1150-50)	4	
-33	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 8 screw (49673 No. H1160-42)	4	
		--------*--------		
-34	HA1727	. TERMINAL BOARD (49673)	2	
-35	HB6443	. TRANSFORMER, POWER, STEP-DOWN (49673)	1	
		(ATTACHING PARTS)		
-36	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 8-32 NC-2A by 5/16 in. lg (49673 No. H1260-40)	2	
-37	COML	. NUT, PLAIN, HEXAGON, Brs, ni plated, No. 8-32 NC-3B (49673 No. H1150-50)	2	
-38	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 8 screw (49673 No. H1160-42)	2	
		--------*--------		
-39	HA1727	. TERMINAL BOARD (49673)	2	
-40	HD6269	. CHASSIS, ELECTRICAL EQUIPMENT (49673)	1	

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
		POWER INPUT PANEL ASSEMBLY		
12-	HB6599	PANEL ASSEMBLY, POWER INPUT (See 62, figure 9 for next higher assembly) (49673)	REF	
-1	5266	. CONNECTOR, PLUG, ELECTRICAL (74545) (49673 No. HA7763)	1	
-2	SR7P	. BUSHING, STRAIN RELIEF, CABLE (28520) (49673 No. HA7746) (shown in two parts)	1	
-3	SJ (7 FEET)	. CABLE, POWER, ELECTRICAL, Three conductor (79566) (49673 No. HA7750)	1	
-4	5-141Y	. TERMINAL BOARD (75173) (49673 No. HA6488)	1	
		(ATTACHING PARTS)		
-5	COML	. SCREW, MACHINE, Bind. hd, brs, ni plated, No. 6-32 NC-2A by 5/8 in. lg (49673 No. H1260-9)	4	
-6	COML	. NUT, PLAIN, HEXAGON, Brs, ni plated, No. 6-32 NC-3B (49673 No. H1150-49)	4	
-7	COML	. WASHER, LOCK, Split, stl, cad. plated, for No. 6 screw (49673 No. H1160-40)	4	
-8	COML	. WASHER, FLAT, Brs, ni plated, for No. 6 screw (49673 No. H1230-34)	4	
		--------*--------		
-9	AGC2	. FUSE, CARTRIDGE, Two amp (71400) (49673 No. HA1289)	1	
	312002	. FUSE, CARTRIDGE, (75915) (49673 No. HA1289)	1	
-10	312001	. FUSE, CARTRIDGE, One amp (75915) (49673 No. HA4227)	1	
-11	342001	. FUSEHOLDER (shown in five parts) (75915) (49673 No. HA1816)	2	
-12	HB6493	. CHASSIS, ELECTRICAL EQUIPMENT (49673)	1	

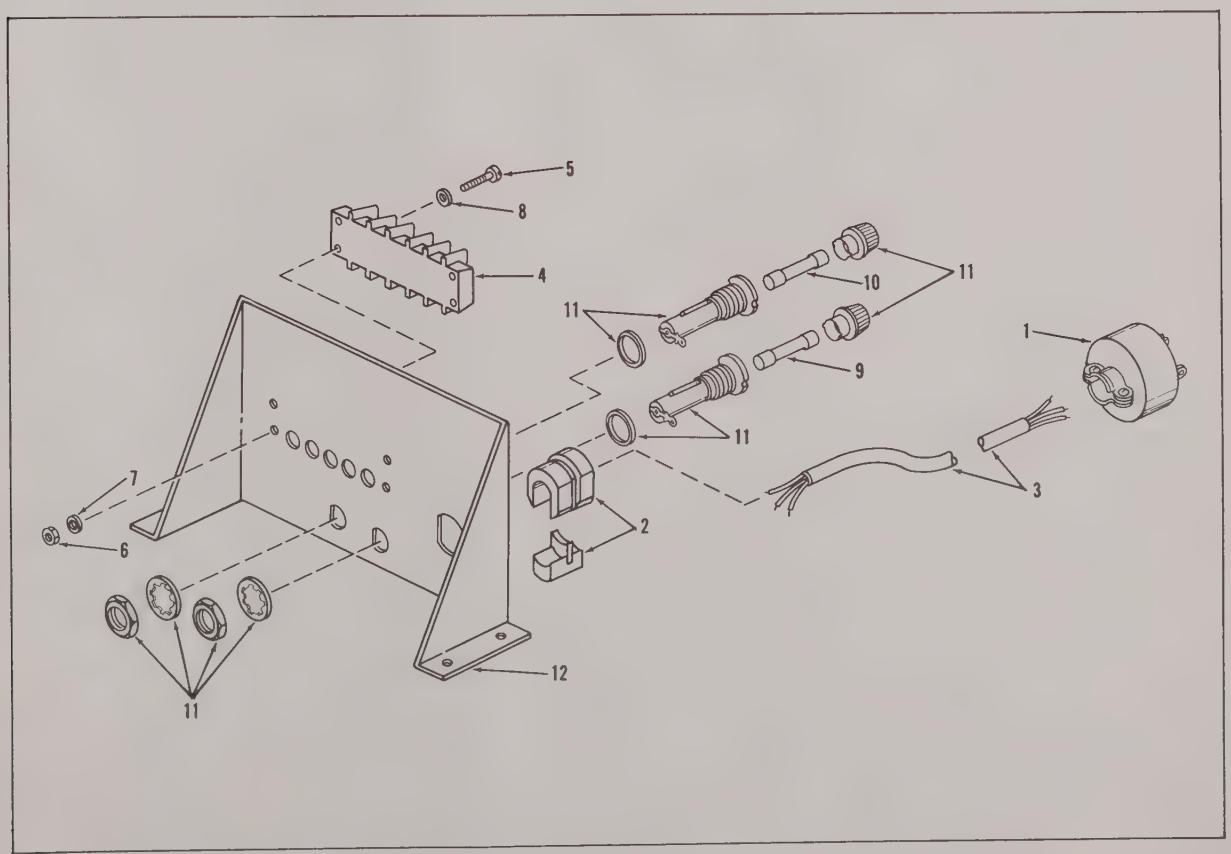

Figure 12. Power Input Panel

SECTION III

NUMERICAL INDEX

PART NUMBER	STOCK NO. CLASS CODE	STOCK NO. SERIAL OR PART NO.	FIG. AND INDEX NO.	QTY PER ART.	SOURCE CODE
AGC2	5920	280-5062	12-9	1	
BR4025			5-52	1	
BW1-10			5-50	1	
BW1-100			4-35	1	
BW1-13			5-49	1	
BW1-130			5-46	1	
BW1-24			5-48	1	
BW1-3.3			5-51	2	
BW1-47			4-34	1	
BW1-82			5-47	1	
BW2-18			4-33	1	
BW2-200			5-45	1	
C8044-1024-67			9-7	10	
DF30BC	5940	271-3897	6-13	4	
FF1004			10-3	1	
HA1289			(See AGC2, 312002)		
			12-9		
HA1291			(See 341001)		
			6-5		
HA1727			11-34	4	
			11-39		
HA1816			(See 342001)		
			12-11		
HA2628			(See 77MIP8)		
			11-12		
HA2854			(See 75C112)		
			6-2		
HA2856			(See 75C111)		
			6-3		
HA2859			(See 836)		
			9-20		
HA2873			(See MAZDA6S6)		
			6-1		
HA2874			(See 123-210-1)		
			9-21		
HA3082			(See 115N0-30)		
			11-11		
HA3688			(See 7765)		
			10-17		
HA4227			(See 312001)		
			12-10		
HA4337			(See ST52K)		
			6-16		
HA4444			(See 103B1AY1)		
			11-10		
HA5395			11-23	1	
HA6163			(See MR5D)		
			11-26		
HA6186			(See W2S11)		
			6-19		
HA6423			(See 436)		
			10-5		
HA6424			(See 437)		
			10-16		
HA6425			(See 438)		
			10-6		
HA6426			10-4	1	
HA6429			(See V3-1JV5)		
			7-1		
			8-1		
HA6430			(See 20SA400)		
			9-36		
HA6432			4-15	1	
HA6433			4-22	2	
HA6447			4-7	1	
HA6467			(See 730)		
			10-1		
HA6472			(See KP10186)		
			9-71		
HA6473			(See KP10187)		
			9-72		
HA6474			(See BR4025)		
			5-52		
HA6475			9-19	1	
HA6478			(See W2)		
			6-17		
HA6479			(See 910SS)		
			9-3		
HA6481-1			(See DF30BC)		
			6-13		
HA6488			(See 5-141Y)		
			12-4		
HA6489			(See 20-141)		
			11-1		

PART NUMBER	STOCK NO. CLASS CODE	STOCK NO. SERIAL OR PART NO.	FIG. AND INDEX NO.	QTY PER ART.	SOURCE CODE
HA6549			(See 20-141MS)		
			11-6		
HA6592			6-14	1	
HA6594			6-38	1	
HA6605			(See 703B)		
			10-21		
HA6606			(See 506S80562)		
			10-2		
HA6607			(See 313003)		
			6-4		
HA6621			3-16	1	
HA6628			4-28	1	
HA6629			(See 910SS)		
			9-4		
HA6630			(See 960SS)		
			9-2		
HA6633			6-	3	
HA6641			9-12	2	
HA6652			(See 48448)		
			9-11		
HA6654			2-8	2	
HA6655			2-6	3	
HA6681			(See C8044-1024-67)		
			9-7		
HA6689			7-6	2	
			8-6		
HA6690			7-4	2	
			8-4		
HA6997			7-3	2	
			8-3		
HA7240			6-21	4	
HA7746			(See SR7P)		
			12-2		
HA7750			(See SJ (7 FEET))		
			12-3		
HA8278			(See 10-141)		
			9-29		
HA9988			6-36	1	
HA9989			(See 1-16D1-4LG TYPE 2)		
			6-35		
HB3089			(See 34D4829)		
			9-51		
HB6404			6-24	1	
			8-		
HB6405			6-26	1	
			8-		
HB6406			6-28	1	
			8-		
HB6407			6-6	1	
			7-		
HB6408			6-8	1	
			7-		
HB6416			(See 4620B)		
			10-15		
HB6418			7-	1	
HB6419			8-	1	
HB6420			8-	1	
HB6422			7-7	1	
HB6434			(See 3037L)		
			6-23		
HB6435			11-30	2	
HB6441			9-33	1	
HB6442			9-26	1	
HB6443			11-35	1	
HB6444			9-56	1	
HB6445			9-65	1	
HB6476			8-7	1	
HB6477			9-58	1	
HB6493			12-12	1	
HB6499			6-	1	
HB6568			(See FF1004)		
			10-3		
HB6571			5-12	1	
HB6572			5-	1	
HB6579			9-73	1	
HB6588			9-	1	
HB6591			6-	1	
HB6596			6-43	1	
HB6599			9-62	1	
			12-		
HB6604			4-4	1	
HB6608			4-	1	
HB6609			4-37	1	
HB6620			3-10	1	

PART NUMBER	STOCK NO. CLASS CODE	STOCK NO. SERIAL OR PART NO.	FIG. AND INDEX NO.	QTY PER ART.	SOURCE CODE
HB6624			9-8	2	
HB6625			9-14	1	
HB6653			(See KL12D) 11-16		
HB9987			6-37	1	
HC10962			3-7	1	
HC6438			3-17	1	
HC6439			3-18	1	
HC6471			4-1	1	
HC6485			10-22	1	
HC6490			4-38	1	
HC6491			5-54	1	
HC6578			10-	1	
HC6589			9-57	2	
HC6600			5-	1	
HC6601			5-53	1	
HC6615			3-3	1	
HC6616			3-4	1	
HC6617			3-1	1	
HC6618			3-2	1	
HC6619			3-6	1	
HD6269			11-40	1	
HD6401			2-	1	
HD6402			2-10	1	
HD6403			3- 3-19	1	
HD6410			6- 3-27	1	
HD6411			9- 9-5	1	
HD6412			10- 9-74	1	
HD6494			2-3	1	
HD6496			2-1	1	
HD6573			3-21	1	
HD6575			5- 3-24	1	
HD6577			4- 9-16	1	
HD6590			11- 9-	1	
HD6622			9-	1	
HD6623			9-13	1	
HE6497			6-44	1	
HE6614			3-5	1	
H1009-182			(See 25ADJ.) 4-36		
H1060-12			(See 1128-1M) 5-37		
H1060-13			(See 1127-500K) 5-31		
H1060-14			(See 1126-300K) 5-25		
H1060-15			(See 1120-100K) 5-24 10-9		
H1060-16			(See 1120-50K) 5-23		
H1060-17			(See 1120-30K) 5-22		
H1060-18			(See 1120-10K) 5-21 10-8		
H1060-19			(See 1120-5K) 5-20		
H1060-20			(See 1120-3K) 5-19		
H1060-21			(See 1120-500) 5-3 5-17		
H1060-22			(See 1120-300) 5-4 5-16		
H1060-23			(See 1120-100) 5-5 5-15 10-11		
H1060-24			(See 1120-50) 5-6		
H1060-25			(See 1120-30) 5-7		
H1060-26			(See 1120-10) 5-8 10-12		
H1060-27			(See 1120-5) 5-9		
H1060-28			(See 1120-3) 5-10		
H1060-29			(See 1120-1) 5-11 10-13		

PART NUMBER	STOCK NO. CLASS CODE	STOCK NO. SERIAL OR PART NO.	FIG. AND INDEX NO.	QTY PER ART.	SOURCE CODE
H1060-30			(See 1120-90K) 10-14		
H1060-31			(See 1120-1K) 5-18 10-7		
H1100-168			(See BW2-200) 5-45		
H1100-169			(See BW1-130) 5-46		
H1100-170			(See BW1-82) 5-47		
H1100-171			(See BW1-24) 5-48		
H1100-172			(See BW1-13) 5-49		
H1100-173			(See BW1-10) 5-50		
H1100-174			(See BW1-3.3) 5-51		
H1100-175			(See 10X800WL) 5-43		
H1100-176			(See 5X500WL) 5-44		
H1100-180			(See 10F4WL) 4-21		
H1100-181			(See 10F2WL) 4-20		
H1100-182			(See 25A1WL) 4-14		
H1100-183			(See BW1-47) 4-34		
H1100-184			(See BW2-18) 4-33		
H1100-185			(See 5F10WL) 4-27		
H1100-186			(See BW1-100) 4-35		
H1100-188			(See 0215) 11-19		
H1100-189			(See 5F20WL) 10-10		
H1130-10			(See SCREW) 5-32		
H1130-16			(See SCREW) 5-38 11-20		
H1130-173			(See SCREW) 3-11		
H1130-28			(See SCREW) 4-16 4-23 4-29		
H1130-37			(See SCREW) 5-26		
H1130-44			(See SCREW) 9-52		
H1150-2			(See NUT) 5-27 5-33 5-39		
H1150-46			(See NUT) 11-14		
H1150-49			(See NUT) 6-11 6-40 11-3 11-21 11-28 12-6		
H1150-50			(See NUT) 4-9 9-41 9-45 10-18 11-8 11-32 11-37		
H1150-56			(See NUT) 3-15		
H1150-59			(See NUT) 4-5		
H1150-6			(See NUT) 4-17 4-24 4-30		
H1150-60			(See NUT) 9-48 9-53 9-59		
H1150-83			(See NUT) 6-30 6-32		

PART NUMBER	STOCK NO. CLASS CODE	STOCK NO. SERIAL OR PART NO.	FIG. AND INDEX NO.	QTY PER ART.	SOURCE CODE
H1160-10			(See WASHER) 9-67		
H1160-29			(See WASHER) 3-12		
			4-6		
			9-49		
			9-54		
			9-60		
H1160-39			(See WASHER) 3-23		
			3-26		
			6-15		
			6-31		
			6-33		
			9-42		
H1160-40			(See WASHER) 3-14		
			4-13		
			4-18		
			4-25		
			4-31		
			5-2		
			5-14		
			5-28		
			5-34		
			5-40		
			6-12		
			6-41		
			9-31		
			9-70		
			11-4		
			11-15		
			11-18		
			11-22		
			11-29		
			12-7		
H1160-42			(See WASHER) 4-3		
			4-10		
			9-18		
			9-23		
			9-28		
			9-35		
			9-38		
			9-46		
			9-64		
			10-19		
			11-9		
			11-33		
			11-38		
H1160-78			(See WASHER) 9-10		
H1170-64			(See RIVET) 2-9		
			6-22		
H1170-80			(See RIVET) 2-7		
H1230-11			(See WASHER) 9-25		
H1230-2			(See INSULATOR) 11-24		
H1230-31			(See WASHER) 4-11		
			9-24		
			9-47		
H1230-32			(See WASHER) 6-34		
			9-43		
			9-68		
H1230-34			(See WASHER) 4-19		
			4-26		
			4-32		
			5-29		
			5-35		
			5-41		
			6-42		
			9-32		
			11-5		
			11-25		
			12-8		
H1230-38			(See WASHER) 9-50		
			9-55		
			9-61		
H1230-5			(See INSULATOR) 7-2		
			8-2		
H1230-61			(See INSULATOR) 5-30		
			5-36		
			5-42		

PART NUMBER	STOCK NO. CLASS CODE	STOCK NO. SERIAL OR PART NO.	FIG. AND INDEX NO.	QTY PER ART.	SOURCE CODE
H1230-77			(See WASHER) 10-20		
H1240-2			(See 2610) 11-7		
H1240-3			9-15	2	
H1260-119			(See SCREW) 9-9		
			9-22		
H1260-146			(See SCREW) 4-8		
H1260-17			(See SCREW) 11-17		
H1260-23			(See SCREW) 6-7		
			6-9		
			6-25		
			6-27		
			6-29		
H1260-29			(See SCREW) 4-12		
			5-1		
			5-13		
			9-39		
			9-69		
			11-13		
			11-27		
H1260-40			(See SCREW) 4-2		
			9-27		
			9-34		
			9-37		
			9-44		
			11-31		
			11-36		
H1260-53			(See SCREW) 3-13		
H1260-55			(See SCREW) 2-4		
			3-22		
			3-25		
			6-18		
			6-20		
			9-40		
			9-66		
H1260-61			(See SCREW) 9-17		
			9-63		
H1260-9			(See SCREW) 9-30		
			11-2		
			12-5		
H1490-13			(See SCREW) 2-5		
H1490-15			(See SCREW) 3-20		
H1490-23			(See SCREW) 9-6		
H1630-27			(See SCREW) 2-2		
H1650-23			(See SCREW) 6-39		
H1650-24			(See SCREW) 6-10		
			9-1		
H1660-19			(See SETSCREW) 7-5		
			8-5	1	
INSULATOR			11-24	4	
INSULATOR			7-2	3	
INSULATOR			5-30	1	
KL12D			11-16	5	
KNSP8			3-9	4	
KNS12			3-8	1	
KP10186			9-71	1	
KP10187			9-72	2	
MAZDA6S6			6-1	1	
MR5D			11-26	3	
NUT			5-27	2	
NUT			11-14	19	
NUT			6-11	20	
NUT			4-9	4	
NUT			3-15	3	
NUT	5310	800-7612	4-5	8	
NUT			4-17	10	
NUT			9-48	6	
NUT			6-30	4	
RIVET			2-9	4	
RIVET			6-22	6	
RIVET			2-7	1	
SCREW			5-32	2	
SCREW			5-38	4	
SCREW			3-11		

PART NUMBER	STOCK NO. CLASS CODE	STOCK NO. SERIAL OR PART NO.	FIG. AND INDEX NO.	QTY PER ART.	SOURCE CODE
SCREW			4-16	8	
SCREW			5-26	1	
SCREW			9-52	2	
SCREW			9-9	8	
SCREW			4-8	2	
SCREW			11-17	2	
SCREW			6-7	10	
SCREW			4-12	19	
SCREW			4-2	18	
SCREW			3-13	6	
SCREW			2-4	29	
SCREW			9-17	8	
SCREW	5305	725-4748	9-30	10	
SCREW			2-5	5	
SCREW			3-20	6	
SCREW			9-6	10	
SCREW			2-2	12	
SCREW			6-39	4	
SCREW			6-10	8	
SETSCREW			7-5	4	
SJ (7 FEET)			12-3	1	
SR7P			12-2	1	
ST5RK	5930	050-2704	6-16	1	
V3-1JV5	5930	549-0585	7-1	2	
			8-1		
WASHER			9-67	4	
WASHER			3-12	17	
WASHER	5310	725-4737	3-23	17	
WASHER	5310	725-4868	3-14	55	
WASHER			4-3	35	
WASHER			9-10	6	
WASHER			9-25	2	
WASHER	5310	209-0552	4-11	8	
WASHER	5310	186-7365	6-34	9	
WASHER			4-19	29	
WASHER			9-50	10	
WASHER			10-20	4	
W2	5950	519-7859	6-17	2	
W2S11			6-19	2	
0215	5905	157-0672	11-19	1	
1-16D1-4LG TYPE 2			6-35	1	
10-141	5940	171-0469	9-29	1	
10F2WL			4-20	1	
10F4WL			4-21	1	
10X800WL			5-43	1	
103B1AY1			11-10	1	
1120-1			5-11	3	
			10-13		
1120-1K			5-18	3	
			10-7		
1120-10			5-8	2	
			10-12		
1120-10K			5-21	2	
			10-8		
1120-100			5-5	3	
			5-15		
			10-11		

PART NUMBER	STOCK NO. CLASS CODE	STOCK NO. SERIAL OR PART NO.	FIG. AND INDEX NO.	QTY PER ART.	SOURCE CODE
1120-100K			5-24	2	
			10-9		
1120-3			5-10	1	
1120-3K			5-19	1	
1120-30			5-7	1	
1120-30K			5-22	1	
1120-300			5-4	2	
			5-16		
1120-5			5-9	1	
1120-5K			5-20	1	
1120-50			5-6	1	
1120-50K			5-23	1	
1120-500			5-3	2	
			5-17		
1120-90K			10-14	1	
1126-300K			5-25	1	
1127-500K			5-31	1	
1128-1M			5-37	1	
115N0-30			11-11	1	
123-210-1			9-21	1	
20-141	5940	186-0933	11-1	1	
20-141MS			11-6	1	
20SA400			9-36	2	
25ADJ.			4-36	1	
25A1WL			4-14	1	
2610	5325	616-0166	11-7	2	
3037L	5930	547-8660	6-23	1	
312001	5920	428-5725	12-10	1	
312002	5920	280-5062	12-	1	
313003	5920	131-9821	6-4	2	
34D4829			9-51	1	
341001	5920	248-8898	6-5	2	
342001	5920	763-5155	12-11	2	
436			10-5	1	
437			10-16	1	
438			10-6	1	
4620B			10-15	1	
48448	5310	489-5846	9-11	6	
5-141Y	5940	204-8437	12-4	1	
5F10WL			4-27	1	
5F20WL			10-10	1	
5X500WL			5-44	1	
506S80562			10-2	1	
5266			12-1	1	
703B	5935	234-2094	10-21	1	
730	5930	642-9685	10-1	1	
75C111			6-3	1	
75C112			6-2	1	
77MIP8	5935	642-0334	11-12	1	
7765			10-17	4	
7901809			(See HD6401) 2-		
836			9-20	1	
910SS			9-3	5	
			9-4		
960SS			9-2	1	

SECTION IV

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIGURE AND INDEX NO.	STOCK NO. CLASS CODE	STOCK NO. SERIAL OR PART NO.	PART NUMBER
CR101	11-10			103B1AY1
CR102	9-51			34D4829
C101,	9-36			20SA400
C102	9-36			20SA400
C103	5-52			BR4025
C104	9-71			KP10186
C105	9-72			KP10187
E101	5-53			HC6601
E102	5-12			HB6571
E103	11-1	5940	186-0933	20-141
E104	4-1			HC6471
E105	4-37			HB6609
E106,	6-5	5920	248-8898	341001
E107	6-5	5920	248-8898	341001
E108,	12-11	5920	763-5155	342001
E109	12-11	5920	763-5155	342001
E112	4-7			HA6447
E113	6-14			HA6592
E114	6-38			HA6594
E115	6-43			HB6596
E127	10-17			7765
E128	10-17			7765
E129	10-17			7765
E130	10-17			7765
E131	6-			HA6633
E132	6-			HA6633
E133	6-			HA6633
E134	6-13	5940	271-3897	DF30BC
E135	6-13	5940	271-3897	DF30BC
E136	6-13	5940	271-3897	DF30BC
D137	6-13	5940	271-3897	DF30BC
F101,	6-4	5920	131-9821	313003
F102	6-4	5920	131-9821	313003
F103	12-9	5920	280-5062	AGC2
F103	12-	5920	280-5062	312002
F104	12-10	5920	428-5725	312001
~~Hoi,~~	6-1			MAZDA6S6
I102	6-1			MAZDA6S6
J102	10-21	5935	234-2094	703B
K101	11-26			MR5D
K102	11-16			KL12D
K103	11-11			115N0-30
L101	9-33			HB6441
L102	9-56			HB6444
M101	3-17			HC6438
M102	3-18			HC6439
M103	10-2			506S80562
P101	12-1			5266
R101	5-43			10X800WL
R102	5-44			5X500WL
R103	5-45			BW2-200
R104	5-46			BW1-130
R105	5-47			BW1-82
R106,	5-51			BW1-3.3
R107	5-51			BW1-3.3
R108	5-50			BW1-10
R109	5-49			BW1-13
R110	5-48			BW1-24
R111	5-37			1128-1M
R112	5-31			1127-500K
R113	5-25			1126-300K
R114	5-24			1120-100K
R115	5-23			1120-50K
R116	5-22			1120-30K
R117	5-21			1120-10K
R118	5-20			1120-5K
R119	5-19			1120-3K
R120	5-18			1120-1K

REFERENCE DESIGNATION	FIGURE AND INDEX NO.	STOCK NO. CLASS CODE	STOCK NO. SERIAL OR PART NO.	PART NUMBER
R121	5-17			1120-500
R122	5-16			1120-300
R123	5-15			1120-100
R124	5-3			1120-500
R125	5-4			1120-300
R126	5-5			1120-100
R127	5-6			1120-50
R128	5-7			1120-30
R129	5-8			1120-10
R130	5-9			1120-5
R131	5-10			1120-3
R132,	5-11			1120-1
R133	5-11			1120-1
R134	11-19	5905	157-0672	0215
R135	4-14			25A1WL
R136	4-20			10F2WL
R137	4-21			10F4WL
R138	4-27			5F10WL
R139	4-33			BW2-18
R140	4-34			BW1-47
R141	4-35			BW1-100
R142	4-36			25ADJ.
R143	10-4			HA6426
R144	10-6			438
R145	10-16			437
R146	10-5			436
R147	10-14			1120-90K
R148	10-10			5F20WL
R149	10-11			1120-100
R150	10-7			1120-1K
R151	10-9			1120-100K
R152	10-8			1120-10K
R153	10-7			1120-1K
R154	10-12			1120-10
R155	10-13			1120-1
S101	7-			HB6418
S102	7-1	5930	549-0585	V3-1JV5
S103	8-			HB6420
S104	8-1	5930	549-0585	V3-1JV5
S105	7-7			HB6422
S106	7-1	5930	549-0585	V3-1JV5
S107	6-23	5930	547-8660	3037L
S110	8-			HB6419
S111	8-1	5930	549-0585	V3-1JV5
S112	6-16	5930	050-2704	ST52K
S113	8-7			HB6476
S114	8-1	5930	549-0585	V3-1JV5
S115	10-3			FF1004
S116	10-1	5930	642-9685	730
S117	10-15			4620B
T101	9-26			HB6442
T102	9-58			HB6477
T103	4-4			HB6604
T104	11-35			HB6443
T105,	11-30			HB6435
T106	11-30			HB6435
T107	6-17	5950	519-7859	W2
T108	6-19			W2S11
T109	6-17	5950	519-7859	W2
T110	6-19			W2S11
T111	9-65			HB6445
V101	9-20			836
X101	9-21			123-210-1
X102	6-3			75C111
X103	6-2			75C112
X104	11-12	5935	642-0334	77MIP8